Agenda

San Miguel Groundwater Sustainability Agency

BOARD OF DIRECTORS

John Green, President — Ashley Sangster, Vice President
Anthony Kalvans, Director — Joseph Parent, Director — Hector Palafox, Director

THURSDAY, March 28, 2019
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.

Public Comment: Please complete a "Request to Speak" form located at the podium in the boardroom in order to address the Board of Directors on any agenda item. Comments are limited to three minutes, unless you have registered your organization with CSD Clerk prior to the meeting. If you wish to speak on an item not on the agenda, you may do so under "Oral Communications." Any member of the public may address the Board of Directors on items on the Consent Calendar. Please complete a "Request to Speak" form as noted above and mark which item number you wish to address.

Meeting Schedule: Regular Board of Director meetings are generally held in the SMCSD Boardroom on the fourth Thursday of each month at 7:00 P.M. Agendas are also posted at: www.sanmiguelcsd.org

Agendas: Agenda packets are available for public inspection 72 hours prior to the scheduled meeting at the Counter/ San Miguel CSD office located at 1150 Mission St., San Miguel, during normal business hours. Any agenda-related writings or documents provided to a majority of the Board of Directors after distribution of the agenda packet are available for public inspection at the same time at the counter/ San Miguel CSD office at 1150 Mission St., San Miguel, during normal business hours.

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. 1-24-2019 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:

1. **Review, Discuss, Receive and File the Invoice #9 dated 02-15-19 (SM20190215-9) for payment for proportional share of the "Paso Robles Basin GSP" for $813.21**

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

   M______________________ S________________________ V__________

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

a. Chapter 6. Water Budgets

b. Chapter 7. Monitoring Networks

c. Chapter 8. Sustainable Management Criteria

d. Chapter 9. Management Actions and Projects fact sheet

e. Appendix A: Additional well logs used to supplement cross sections

f. Appendix B: Methodology for identifying potential groundwater dependent ecosystems

g. Appendix C: Hydrographs

h. Appendix D: Summary of Model update and modifications

I. Appendix E: Monitoring Protocols

j. Appendix G: PR formation aquifer RMS Hydrographs and well data

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

M______________________ **S**______________________ **V**__________

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 March 21, 2019

Date: March 21, 2019

Tamara Parent
Tamara Parent, Board Clerk/ Accounts Manager

Rob Roberson
Rob Roberson, Fire Chief/Interim General Manager

SAN MIGUEL COMMUNITY SERVICES DISTRICT
BOARD OF DIRECTORS
GROUNDWATER SUSTAINABILITY AGENCY MEETING MINUTES

January 24, 2018

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

I. Meeting Called to Order by Director Parent – 5:30 P.M.

II. Pledge of Allegiance lead by Director Parent

III. **Roll Call:** Directors Present: Green, Parent, Palafox, Kalvans, Sangster.
Director Absent: None
District Staff in attendance: Rob Roberson, Kelly Dodds, Tamara Parent
District Engineer, Blaine Reely
District General White

IV. **Adoption of Special Meeting Agenda:**
Motion by Director Kalvans to adopt Meeting Agenda as presented.
Seconded by Director Parent Motion was approved by vote of 4 AYES and 0 NOES 1 ABSENT.
President Green arrives at 5:35 PM

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 10-25-2018 GSA Meeting Minutes

Motion by Director Parent to approve Consent calendar.

Seconded by Director Sangster. Motion was approved by Vote of 5 AYES and 0 NOES and 0 ABSENT.

The items listed below 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.

BOARD ACTION ITEMS:

1. **Review, Discuss, Receive and File the Invoice #5 (SM20181012-5) for payment for proportional share of the "Paso Robles Basin GSP" for $3,724.30.**

   Item presented by District Engineer Dr. Reely and there is still no new chapter of the GSP (Groundwater Stainability Plan) but the District was a little behind on approving the due invoices. Mr. Reely asked for any questions.

   Board Comment: Director Sangster asked who had the final say on these invoices? Dr. Reely explained that Paso Robles per the contract has the final approval.
   Director Kalvans voiced that he thought it was an abuse of public funds and felt that the consultants that were hired have eaten at the most expensive restaurants in Paso Robles. Discussion ensued about expenses. Dr. Reely explained that the Boards concerns have been brought to the other participants and they too have the same concerns.
   Consensus of the Board it to not approve any more funds for the GSP project.
   Director Sangster would like to look at the Districts policy for Contracts.
   Director of Utilities Kelly Dodds explained that we are being reimbursed for the invoices that are being approved tonight.

   Public Comment: None

   Motion by Director Parent to Receive and File Invoice SM20181012-5 for $3,724.30.

   Seconded by Director Sangster, Motion was approved by Vote of 5 AYES and 0 NOES and 0 ABSENT.

2. **Review, Discuss, Receive and File the Invoice #6 (SM20181102-6) for payment for proportional share of the "Paso Robles Basin GSP" for $2,671.07**

Board Comment: None
Public Comment: None

Motion by Director Sangster to Receive and File Invoice SM20181102-6 for $2,671.07.

Seconded by Director Kalvans, Motion was approved by Vote of 5 AYES and 0 NOES and 0 ABSENT.

3. **Review, Discuss, Receive and File the Invoice #7 (SM20181203-7) for payment for proportional share of the "Paso Robles Basin GSP" for $2,013.84**

   Board Comment: None
   Public Comment: None

   Motion by Director Parent to Receive and File Invoice SM20181203-7 for $2013.84.

   Seconded by Director Sangster, Motion was approved by Vote of 5 AYES and 0 NOES and 0 ABSENT.

4. **Review, Discuss, Receive and File the Invoice #8 (SM20190110-8) for payment for proportional share of the "Paso Robles Basin GSP" for $952.**

   Board Comment: None
   Public Comment: None

   Motion by Director Sangster to Receive and File Invoice SM20190110-8 for $952.00

   Seconded by Director Parent, Motion was approved by Vote of 5 AYES and 0 NOES and 0 ABSENT.

XII. **BOARD COMMENT:** Director Parent voiced that he would like to have a timeline for reimbursement of these invoices.

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 @ 6:28 P.M

City of Paso Robles
Administrative Services Department
821 Pine Street, Suite A
Paso Robles, CA 93446

INVOICE

INVOICE #SM20190215-9
CUSTOMER # 5922

DATE: 02-15-2019

TO:
San Miguel Community Services District
Attn: Rob Roberson, Interim General Mgr.
1150 Mission Street
San Miguel, CA 93451
Email: rob.roberson@sanmiguelcsd.org

FOR SERVICE PROVIDED BY:
City of Paso Robles
Public Works Department
1000 Spring Street
Paso Robles, CA 93446-7392
Phone (805) 237-3861 Fax (805) 237-3904

GL 407-23090

DESCRIPTION	Total Invoice	Share %	AMOUNT
Proportional Share of the "Paso Robles Basin GSP"			
Montgomery & Assoc. Invoice No. 9200-18-3A Dated 12/31/2018 (copy attached)	27,107.02	3%	$813.21
PAST DUE AMOUNT			$9,362.03
		TOTAL DUE:	**$10,175.24**

Make all checks payable to: **City of Paso Robles**
And return to: **City of Paso Robles**
Attn: Ryan Cornell, Finance Mgr.
821 Pine Street, Suite A
Paso Robles, CA 93446-2881

PLEASE INCLUDE COPY OF INVOICE WITH YOUR PAYMENT
*****Remittance Copy*****

MONTGOMERY
& ASSOCIATES
Water Resource Consultants

www.elmontgomery.com
1550 East Prince Road
Tucson, AZ 85719
520.881.4912

INVOICE

December 31, 2018

INVOICE NO
9200-18-3A

CITY OF PASO ROBLES
Attn: Mr. Dick McKinley, Project Manager
1000 Spring Street
Paso Robles, CA 93446
DMcKinley@prcity.com

Paso Robles GSP Preparation

PERIOD: December 01, 2018 - December 31, 2018

9200.0101 Project Management-M&A

Professional services: update calendar of deliverables.

Timothy P. Leo, Scientist VIII		
0.5 hours @ $195.00/hr.	$97.50	
Mekha Pereira, Scientist I		
0.5 hours @ $89.00/hr.	$44.50	
9200.0101 Subtotal		$142.00

9200.0201 GSA Coordination-M&A

Professional services: review comments and emails from DWR; attend meeting with DWR regarding Prop 1 funding; calls and emails with GSA staff members; prepare for and attend 12/12 GSA staff meeting; and download public comments and update schedules.

Derrik Williams, Scientist VIII		
11.0 hours @ $240.00/hr.	$2,640.00	
Juliet M. McKenna, Scientist V		
4.0 hours @ $157.00/hr.	$628.00	
Expenses		
Expenses +10%:		
Lunch with consulting team	$63.88	
+10%	$6.39	
9200.0201 Subtotal		$3,338.27

(continued)

STATEMENT - December 31, 2018 (continued)

9200.0301 Administrative Chapters-M&A

Professional services: review and incorporate GSAs comments and prepare administrative drafts of Chapters 1 - 3; and edit figures for Chapters 1 - 3.

Timothy P. Leo, Scientist VIII 0.5 hours @ $195.00/hr.	$97.50	
Juliet M. McKenna, Scientist V 9.5 hours @ $157.00/hr.	$1,491.50	
Colin P. Kikuchi, Scientist IV 0.5 hours @ $142.00/hr.	$71.00	
Jonathan Reeves, Scientist I 2.0 hours @ $89.00/hr.	$178.00	
Cynthia E. Stefan, Drafter III 3.0 hours @ $85.00/hr.	$255.00	
Tracie L. Jaeger, Clerical 11.0 hours @ $47.00/hr.	$517.00	
9200.0301 Subtotal		$2,610.00

9200.0401 HCM and Current Conditions- M&A

Professional services: prepare new depth to water maps.

Anna M. Urizar, Drafter III 1.0 hours @ $85.00/hr.	$85.00	
9200.0401 Subtotal		$85.00

9200.0501 Data, Monitoring System, and Database-M&A

Professional services: review current data sets for monitoring program; and review approach to developing monitoring program.

Derrik Williams, Scientist VIII 1.5 hours @ $240.00/hr.	$360.00	
Juliet M. McKenna, Scientist V 4.0 hours @ $157.00/hr.	$628.00	
Anna M. Urizar, Drafter III 10.5 hours @ $85.00/hr.	$892.50	
9200.0501 Subtotal		$1,880.50

(continued)

MONTGOMERY
& ASSOCIATES

STATEMENT - December 31, 2018 (continued)

9200.0601 GW Model & Water Budget Chapter-M&A

Professional services: prepare and review water budget chapter; prepare and review Appendix 6A documenting model modifications and updates; clean data before it is put into database; and prepare data delivery to USGS, including review of files with confidential data.

Timothy P. Leo, Scientist VIII 32.0 hours @ $195.00/hr.	$6,240.00	
Derrik Williams, Scientist VIII 10.0 hours @ $240.00/hr.	$2,400.00	
Colin P. Kikuchi, Scientist IV 30.0 hours @ $142.00/hr.	$4,260.00	
Jonathan Reeves, Scientist I 12.5 hours @ $89.00/hr.	$1,112.50	
Cynthia E. Stefan, Drafter III 3.5 hours @ $85.00/hr.	$297.50	
Caryn S. Fogel, Technical Editor 3.5 hours @ $50.00/hr.	$175.00	
9200.0601 Subtotal		$14,485.00

9200.0701 Projects & Actions, & Decision Tool-M&A

Professional services: outline approach to presenting projects and management actions; and take calls from stakeholders management actions.

Timothy P. Leo, Scientist VIII 2.5 hours @ $195.00/hr.	$487.50	
Derrik Williams, Scientist VIII 1.0 hours @ $240.00/hr.	$240.00	
Colin P. Kikuchi, Scientist IV 0.5 hours @ $142.00/hr.	$71.00	
9200.0701 Subtotal		$798.50

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STATEMENT - December 31, 2018 (continued)

9200.0704 Projects & Actions, & Decision Tool-WestWater

Professional services: expenses incurred.

Expenses		
Expenses +10%:		
West Water Research	$647.50	
+10%	$64.75	
9200.0704 Subtotal		$712.25

9200.0705 Projects & Actions, & Decision Tool-O'Laughlin

Professional services: expenses incurred.

Expenses		
Expenses +10%:		
O'Laughlin & Paris LLP	$420.00	
+10%	$42.00	
9200.0705 Subtotal		$462.00

9200.0901 Sustainable Management Criteria-M&A

Professional services: draft SMC chapter; and prepare summary of methods used to compute measurable objectives at representative monitoring points.

Timothy P. Leo, Scientist VIII 0.5 hours @ $195.00/hr.	$97.50	
Derrik Williams, Scientist VIII 9.0 hours @ $240.00/hr.	$2,160.00	
Colin P. Kikuchi, Scientist IV 1.0 hours @ $142.00/hr.	$142.00	
9200.0901 Subtotal		$2,399.50

(continued)

MONTGOMERY & ASSOCIATES

STATEMENT - December 31, 2018 (continued)

9200.1001 Finalize GSP-M&A

Professional services: develop tables of references and acronyms.

Caryn S. Fogel, Technical Editor 2.0 hours @ $50.00/hr.	$100.00	
Tracie L. Jaeger, Clerical 2.0 hours @ $47.00/hr.	$94.00	
9200.1001 Subtotal		$194.00

TOTALS:

9200.0101 Subtotal	$142.00
9200.0201 Subtotal	$3,338.27
9200.0301 Subtotal	$2,610.00
9200.0401 Subtotal	$85.00
9200.0501 Subtotal	$1,880.50
9200.0601 Subtotal	$14,485.00
9200.0701 Subtotal	$798.50
9200.0704 Subtotal	$712.25
9200.0705 Subtotal	$462.00
9200.0901 Subtotal	$2,399.50
9200.1001 Subtotal	$194.00
TOTAL AMOUNT DUE	$27,107.02

MONTGOMERY & ASSOCIATES

Mark M. Cross

Outstanding Invoices:

INVOICE NO	DATE	BALANCE DUE
9200-18-2A	11/30/18	$31,760.40 USD
Total Outstanding Invoices:		$31,760.40 USD

DUE UPON RECEIPT FOR PAYMENT WITHIN 45 DAYS.
IF PAYMENT HAS NOT BEEN RECEIVED WITHI 45 DAYS, INTEREST WILL ACCRUE AT 1% PER MONTH FOR UNPAID BALANCE.

MONTGOMERY
& ASSOCIATES

TIME REPORT

NAME: Timothy P. Leo

PROJECT NUMBER: 9200.0101

PERIOD: 12/1/2018 - 12/31/2018

City of Paso Robles Project Management-M&A

DATE	TIME START	TIME STOP	HOURS	WORK DESCRIPTION
12/21/18	11:30	12:00	0.5	Call with D. Williams to review City input on budget

TOTAL 0.5 HOURS

MONTGOMERY & ASSOCIATES

TIME REPORT

NAME: Mekha Pereira

PROJECT NUMBER: 9200.0101

PERIOD: 12/1/2018 - 12/31/2018

City of Paso Robles Project Management-M&A

DATE	TIME START	TIME STOP	HOURS	WORK DESCRIPTION
12/14/18	14:30	15:00	0.5	Update calendar with revised deadlines
	TOTAL		**0.5 HOURS**	

MONTGOMERY
& ASSOCIATES

TIME REPORT

NAME: Derrik Williams

PROJECT NUMBER: 9200.0201

PERIOD: 12/1/2018 - 12/31/2018

City of Paso Robles GSA Coordination-M&A

DATE	TIME START	TIME STOP	HOURS	WORK DESCRIPTION
12/03/18	8:00	08:30	0.5	Prepare notes on responses to request for December 13 meeting; review comments sent by B. Gooding; prepare notes on upcoming meeting with M. Owen from DWR
12/04/18	17:00	17:30	0.5	Respond to questions from A. Ruberto regarding schedule and GSP plans
12/05/18	15:00	17:00	2.0	Meeting with DWR regarding Proposition 1 contract
12/07/18	15:00	16:00	1.0	Set up 12/12/2018 meeting; respond to emails from A. Ruberto; review monitoring protocol data from County
12/10/18	10:30	11:00	0.5	Call with W. Cunha regarding three articles on basin, status of overdraft, etc.
	14:00	14:30	0.5	Edit agenda for 12/12 meeting; call with T. Leo regarding 12/12 meeting
12/12/18	11:00	17:00	6.0	GSA Staff meeting

TOTAL 11.0 HOURS

MONTGOMERY
& ASSOCIATES

TIME REPORT

NAME: Juliet M. McKenna

PROJECT NUMBER: 9200.0201

PERIOD: 12/1/2018 - 12/31/2018

City of Paso Robles GSA Coordination-M&A

DATE	TIME START	TIME STOP	HOURS	WORK DESCRIPTION
12/10/18	13:30	14:00	0.5	Update schedule and review progress on chapters with staff
12/11/18	8:00	10:00	2.0	Download public comments and update review schedule; communicate with team and clients on same
	17:00	18:30	1.5	Update schedule based on input from team on chapters and appendices

TOTAL 4.0 HOURS

9200.0201

La Cosecha
835 12th Ave
Paso Robles CA 93446
805-237-0019

Server: Jason DOB: 12/12/2018
12:48 PM 12/12/2018
201/1 4/40001

SALE

Visa 4194305
Card #XXXXXXXXXXXX1046
Magnetic card present: WILLIAMS DERRIK
Card Entry Method: S

Approval: 012168

Amount: $ 53.88

+ Tip: 10

= Total: ______

I agree to pay the above
total amount according to the
card issuer agreement.

X______

Thank You

Business Meal
D. Williams Lunch with Consulting Team.

MONTGOMERY & ASSOCIATES

TIME REPORT

NAME: Timothy P. Leo

PROJECT NUMBER: 9200.0301

PERIOD: 12/1/2018 - 12/31/2018

City of Paso Robles Administrative Chapters-M&A

DATE	TIME START	TIME STOP	HOURS	WORK DESCRIPTION
12/03/18	18:00	18:30	0.5	Review comments on GSP Chapters 1 - 3; provide input on comments to team

TOTAL 0.5 HOURS

MONTGOMERY
& ASSOCIATES

TIME REPORT

NAME: Juliet M. McKenna

PROJECT NUMBER: 9200.0301

PERIOD: 12/1/2018 - 12/31/2018

City of Paso Robles Administrative Chapters-M&A

DATE	TIME START	TIME STOP	HOURS	WORK DESCRIPTION
12/04/18	17:00	19:30	2.5	Review and incorporate GSAs comments and prepare administrative drafts of Chapters 1 - 3
12/10/18	9:00	10:30	1.5	Review GSA comments with D. Williams and prepare administrative draft
	14:00	15:00	1.0	Review and respond to County comments on Chapters 1-3; coordinate figure edits; prepare administrative drafts
12/11/18	10:00	12:30	2.5	Respond to comments and prepare administrative draft; update references, abbreviations and acronyms, and definitions documents; request clarification from clients on same
12/15/18	12:00	14:00	2.0	Prepare and post final administrative drafts and responses to comments

TOTAL 9.5 HOURS

MONTGOMERY
& ASSOCIATES

TIME REPORT

NAME: Colin P. Kikuchi

PROJECT NUMBER: 9200.0301

PERIOD: 12/1/2018 - 12/31/2018

City of Paso Robles Administrative Chapters-M&A

DATE	TIME START	TIME STOP	HOURS	WORK DESCRIPTION
12/11/18	9:30	10:00	0.5	Prepare figure showing annual precipitation for GSP

TOTAL 0.5 HOURS

MONTGOMERY
& ASSOCIATES

TIME REPORT

NAME: Jonathan Reeves

PROJECT NUMBER: 9200.0301

PERIOD: 12/1/2018 - 12/31/2018

City of Paso Robles Administrative Chapters-M&A

DATE	TIME START	TIME STOP	HOURS	WORK DESCRIPTION
12/03/18	13:00	14:30	1.5	Generate well counts; prepare explanation text
12/10/18	17:00	17:30	0.5	Review precipitation table and figure

TOTAL 2.0 HOURS

MONTGOMERY
& ASSOCIATES

TIME REPORT

NAME: Cynthia E. Stefan

PROJECT NUMBER: 9200.0301

PERIOD: 12/1/2018 - 12/31/2018

City of Paso Robles Administrative Chapters-M&A

DATE	TIME START	TIME STOP	HOURS	WORK DESCRIPTION
12/05/18	8:30	11:30	3.0	Revise figures and table for Chapter 3; organize GIS files

TOTAL 3.0 HOURS

MONTGOMERY
& ASSOCIATES

TIME REPORT

NAME: Tracie L. Jaeger

PROJECT NUMBER: 9200.0301

PERIOD: 12/1/2018 - 12/31/2018

City of Paso Robles Administrative Chapters-M&A

DATE	TIME START	TIME STOP	HOURS	WORK DESCRIPTION
12/12/18	12:00	14:00	2.0	Format Chapters 1-3
	15:00	16:30	1.5	Format Chapters 1-3
12/13/18	11:00	13:00	2.0	Replace figure in Chapter 4; format Chapters 1-3
	14:00	17:30	3.5	Format Chapters 1-3
12/14/18	10:00	12:00	2.0	Review references
	TOTAL		**11.0 HOURS**	

MONTGOMERY
& ASSOCIATES

TIME REPORT

NAME: Anna M. Urizar

PROJECT NUMBER: 9200.0401

PERIOD: 12/1/2018 - 12/31/2018

City of Paso Robles HCM and Current Conditions- M&A

DATE	TIME START	TIME STOP	HOURS	WORK DESCRIPTION
12/13/18	11:30	12:30	1.0	Prepare new model measured depth to water map
	TOTAL		1.0	HOURS

MONTGOMERY
& ASSOCIATES

TIME REPORT

NAME: Derrik Williams

PROJECT NUMBER: 9200.0501

PERIOD: 12/1/2018 - 12/31/2018

City of Paso Robles Data, Monitoring System, and Database-

DATE	TIME START	TIME STOP	HOURS	WORK DESCRIPTION
12/10/18	8:00	09:30	1.5	Review approach to Chapter 8 with J. McKenna; review all comments on Chapters 1 through 3 with J. McKenna

TOTAL 1.5 HOURS

MONTGOMERY
& ASSOCIATES

TIME REPORT

NAME: Juliet M. McKenna

PROJECT NUMBER: 9200.0501

PERIOD: 12/1/2018 - 12/31/2018

City of Paso Robles Data, Monitoring System, and Database-

DATE	TIME START	TIME STOP	HOURS	WORK DESCRIPTION
12/14/18	18:00	20:00	2.0	Compile and review background documentation
12/21/18	9:00	11:00	2.0	Chapter 8 - Review regulations and requirements; assess current datasets

TOTAL 4.0 HOURS

MONTGOMERY & ASSOCIATES

TIME REPORT

NAME: Anna M. Urizar

PROJECT NUMBER: 9200.0501

PERIOD: 12/1/2018 - 12/31/2018

City of Paso Robles Data, Monitoring System, and Database-

DATE	TIME START	TIME STOP	HOURS	WORK DESCRIPTION
12/04/18	14:00	15:00	1.0	Prepare new DEM and hillshade for extended map base
12/13/18	9:30	11:30	2.0	Relink files broken by database cleanup and organization
12/14/18	9:00	16:30	7.5	Relink files, prepare edits, and prepare new JPGs
	TOTAL		**10.5**	**HOURS**

MONTGOMERY
& ASSOCIATES

TIME REPORT

NAME: Timothy P. Leo

PROJECT NUMBER: 9200.0601

PERIOD: 12/1/2018 - 12/31/2018

City of Paso Robles GW Model & Water Budget Chapter-M&

DATE	TIME START	TIME STOP	HOURS	WORK DESCRIPTION
12/03/18	16:00	17:00	1.0	Prepare water budget chapter of GSP
	18:30	19:00	0.5	Prepare water budget chapter
12/04/18	13:00	13:30	0.5	Coordinate with modeling staff on future water budget results; review draft figure
	14:00	14:30	0.5	Review table of files with confidential data; send to County per their request
	17:30	18:00	0.5	Review future water budget summary
	18:00	18:30	0.5	Update water budget chapter with revised tables; coordinate revision to figure
12/05/18	7:00	08:00	1.0	Review future water budget summary; update water budget chapter
	13:30	14:00	0.5	Coordinate with project team on water budget chapter review
	15:30	16:00	0.5	Update water budget chapter; send to front office for review
12/06/18	11:30	12:30	1.0	Prepare draft Chapter 6 on water budgets
	14:00	14:30	0.5	Schedule review of draft Chapter 6 by front office; update chapter text
12/12/18	10:30	11:00	0.5	Prepare draft Chapter 6 text
12/13/18	8:30	10:00	1.5	Prepare draft GSP Chapter 6
	13:00	14:00	1.0	Prepare draft GSP Chapter 6
12/14/18	6:30	08:00	1.5	Prepare GSP Chapter 6 on water budgets
	10:00	11:00	1.0	Prepare draft Chapter 6 on water budgets
	12:30	13:30	1.0	Prepare draft GSP Chapter 6
	14:00	14:30	0.5	Prepare draft GSP Chapter 6; send to team for review
	14:30	15:00	0.5	Compile information on rural-domestic pumping; send to R. Diffenbaugh
	17:00	18:00	1.0	Finalize draft GSP Chapter 6; send to GSAs for review
12/17/18	9:30	10:00	0.5	Respond to questions and comments from GSAs on Chapter 6
12/19/18	17:00	17:30	0.5	Coordinate with staff on modeling appendix
12/20/18	16:30	17:30	1.0	Prepare Appendix 6A on model update
	21:00	21:30	0.5	Coordinate with GSAs on delivery on modeling appendix and review of Chapter 6

Continued on next page...

MONTGOMERY
& ASSOCIATES

TIME REPORT

NAME: Timothy P. Leo

PROJECT NUMBER: 9200.0601

...continued from previous page

PERIOD: 12/1/2018 - 12/31/2018

City of Paso Robles GW Model & Water Budget Chapter-M&

DATE	TIME START	TIME STOP	HOURS	WORK DESCRIPTION
12/21/18	10:30	11:30	1.0	Review draft modeling appendix
12/26/18	10:30	11:00	0.5	Review revisions on Appendix 6A from staff
	11:30	13:00	1.5	Revise Appendix 6A per staff comments; provide guidance to staff on figures and tables
	16:00	17:30	1.5	Prepare Appendix 6A text
12/27/18	14:30	15:30	1.0	Review revised Appendix 6A; coordinate with staff on revisions
	16:00	17:00	1.0	Review updated Appendix 6A tables; revise text; coordinate with staff on appendix content
12/28/18	8:30	09:00	0.5	Coordinate work on Appendix 6A
	13:00	13:30	0.5	Review revised Appendix 6A text
	14:30	15:00	0.5	Provide guidance to staff on revisions to Appendix 6A
	16:30	17:30	1.0	Review update Appendix 6A; revise tables
12/31/18	10:00	11:30	1.5	Prepare Appendix 6A on model update and water budgets
	12:30	14:00	1.5	Prepare Appendix 6A on model update and water budgets
	15:00	17:00	2.0	Finalize Appendix 6A on model update and water budgets; send to GSAs for review

TOTAL 32.0 HOURS

MONTGOMERY & ASSOCIATES

TIME REPORT

NAME: Derrik Williams

PROJECT NUMBER: 9200.0601

PERIOD: 12/1/2018 - 12/31/2018

City of Paso Robles GW Model & Water Budget Chapter-M&

DATE	TIME START	TIME STOP	HOURS	WORK DESCRIPTION
12/05/18	20:00	22:00	2.0	Review Chapter 6
12/06/18	19:00	20:00	1.0	Review Chapter 6
12/07/18	8:00	09:00	1.0	Review Chapter 6
	10:00	11:00	1.0	Review Chapter 6
12/11/18	8:30	09:00	0.5	Review email on Chapter 4 and 5 comments; schedule Chapter 6 release
	14:30	15:30	1.0	Edit Appendices for Chapters 4 and 5
12/14/18	14:00	15:00	1.0	Review Chapter 6
12/26/18	10:00	11:30	1.5	Review Appendix 6A
12/28/18	10:00	10:30	0.5	Review C. Kikuchi work on Appendix 6A; call with T. Leo to review plan to complete Appendix 6A
12/31/18	10:00	10:30	0.5	Call with C. Kikuchi regarding Appendix 6A

TOTAL 10.0 HOURS

MONTGOMERY & ASSOCIATES

TIME REPORT

NAME: Colin P. Kikuchi

PROJECT NUMBER: 9200.0601

PERIOD: 12/1/2018 - 12/31/2018

City of Paso Robles GW Model & Water Budget Chapter-M&

DATE	TIME START	TIME STOP	HOURS	WORK DESCRIPTION
12/04/18	11:00	12:30	1.5	Prepare summary of future water budget analyses
	12:30	13:00	0.5	Prepare data delivery for USGS
12/05/18	9:30	10:00	0.5	Prepare figures and tables for GSP
12/08/18	14:30	16:00	1.5	Revise groundwater model and water budget figures
12/12/18	11:30	13:30	2.0	Revise groundwater model and water budget figures
12/14/18	10:30	11:00	0.5	Prepare GSP water budget chapter
	15:30	16:30	1.0	Prepare GSP water budget chapter
12/17/18	10:30	11:00	0.5	Prepare charts for water budget chapter
12/19/18	9:30	11:00	1.5	Prepare appendix documenting model update procedures
	11:30	15:30	4.0	Prepare appendix documenting model update procedures
12/20/18	8:30	10:00	1.5	Prepare appendix documenting model update procedures
	13:30	14:00	0.5	Prepare appendix documenting model update procedures
12/27/18	11:00	14:30	3.5	Prepare appendix documenting model update procedures
	16:00	16:30	0.5	Prepare appendix documenting model update procedures
12/28/18	9:30	11:30	2.0	Prepare appendix documenting model update procedures
	12:30	14:30	2.0	Prepare appendix documenting model update procedures
	15:00	16:30	1.5	Prepare appendix documenting model update procedures
12/31/18	10:00	11:00	1.0	Prepare appendix documenting model update procedures
	12:30	15:00	2.5	Prepare appendix documenting model update procedures
	15:30	17:00	1.5	Prepare appendix documenting model update procedures

TOTAL 30.0 HOURS

MONTGOMERY
& ASSOCIATES

TIME REPORT

NAME: Jonathan Reeves

PROJECT NUMBER: 9200.0601

PERIOD: 12/1/2018 - 12/31/2018

City of Paso Robles GW Model & Water Budget Chapter-M&

DATE	TIME START	TIME STOP	HOURS	WORK DESCRIPTION
12/05/18	8:30	09:00	0.5	Update cumulative change in storage figure
12/06/18	13:00	18:00	5.0	Update water budget and change in storage figures
12/13/18	8:30	11:30	3.0	Update figures
12/14/18	8:30	12:30	4.0	Update model inputs and processes

TOTAL 12.5 HOURS

MONTGOMERY & ASSOCIATES

TIME REPORT

NAME: Cynthia E. Stefan

PROJECT NUMBER: 9200.0601

PERIOD: 12/1/2018 - 12/31/2018

City of Paso Robles GW Model & Water Budget Chapter-M&

DATE	TIME START	TIME STOP	HOURS	WORK DESCRIPTION
12/11/18	10:00	11:00	1.0	Revise figures and calculations
12/27/18	12:00	14:30	2.5	Search for geodatabase and remake and symbolize hillshade and color flood for missing data on Figure 6-2

TOTAL 3.5 HOURS

MONTGOMERY
& ASSOCIATES

TIME REPORT

NAME: Caryn S. Fogel

PROJECT NUMBER: 9200.0601

PERIOD: 12/1/2018 - 12/31/2018

City of Paso Robles GW Model & Water Budget Chapter-M&

DATE	TIME START	TIME STOP	HOURS	WORK DESCRIPTION
12/05/18	15:30	16:30	1.0	Conduct editorial review of Paso Robles GSP Chapter 6
12/06/18	8:30	10:00	1.5	Conduct editorial review of Paso Robles GSP Chapter 6
12/07/18	12:00	13:00	1.0	Conduct Paso Robles Chapter 6 editorial review

TOTAL 3.5 HOURS

MONTGOMERY
& ASSOCIATES

TIME REPORT

NAME: Timothy P. Leo

PROJECT NUMBER: 9200.0701

PERIOD: 12/1/2018 - 12/31/2018

City of Paso Robles Projects & Actions, & Decision Tool-M&A

DATE	TIME START	TIME STOP	HOURS	WORK DESCRIPTION
12/12/18	16:00	17:30	1.5	Meet with team on projects and management actions; develop approach for preparing GSP Chapter 9
12/18/18	11:30	12:00	0.5	Plan projects and actions work with project manager
12/19/18	16:00	16:30	0.5	Review email to GSAs regarding approach for projects and actions development; phone call with Carollo on modeling recharge projects

TOTAL 2.5 HOURS

MONTGOMERY & ASSOCIATES

TIME REPORT

NAME: Derrik Williams

PROJECT NUMBER: 9200.0701

PERIOD: 12/1/2018 - 12/31/2018

City of Paso Robles   Projects & Actions, & Decision Tool-M&A

DATE	TIME START	TIME STOP	HOURS	WORK DESCRIPTION
12/10/18	11:00	11:30	0.5	Outline Chapter 9 with B. Weeks and M. Payne
12/14/18	13:30	14:00	0.5	Call with S. Sinton regarding water markets; email M. Payne regarding call with S. Sinton

TOTAL 1.0 HOURS

MONTGOMERY
& ASSOCIATES

TIME REPORT

NAME: Colin P. Kikuchi

PROJECT NUMBER: 9200.0701

PERIOD: 12/1/2018 - 12/31/2018

City of Paso Robles Projects & Actions, & Decision Tool-M&A

DATE	TIME START	TIME STOP	HOURS	WORK DESCRIPTION
12/19/18	16:00	16:30	0.5	Participate in conference call with Carollo to plan Projects & Actions modeling

TOTAL 0.5 HOURS

WestWater Research LLC

805 W. Idaho St., Ste. 310
Boise, ID 83702
(208) 433-0255
F.E.I.N. 81-0544045

Invoice

9200.0704

Date	Invoice No.	Terms
12/31/2018	**26718**	*Net 60*

Bill To

E.L. Montgomery & Associates
1550 East Prince Road
Tucson, AZ 85719

Project
Paso Robles Work Order No. 2

Purchase Order # N/A

Description	Qty/Hours	Rate	Amount
Development for Projects & Programs: Paso Robles Work Order No. 2			
Administrative support provided by Julie Mai	1.5	65.00	97.50
Valuation Services provided by Principal Matt Payne	2.5	220.00	550.00
Development of management actions and projects. Coordination with GSP team. Continue refining projects and management actions fact sheet for internal consumption.			

Thank You for Your Business

Payment Options:

Please pay by Wire or Electronic Payments (please notify me by email.)
Washington Federal Bank, Account # 2967034584
ABA/Wire Transfer Routing #325070980
Checks can be written to WestWater Research LLC
and mailed to 805 W Idaho St, Ste 310, Boise ID 83702.
Any questions, please email mai@waterexchange.com. Thank you!

Total	$647.50
Payments/Credits	$0.00
Balance Due	$647.50

O'Laughlin & Paris LLP

2617 K Street, Suite 100
Sacramento, CA 95816

Phone (916) 993-3962

BILL TO:

Montgomery & Associates
1902-Paso Robles GSP
Attention: Gabriela Martinez
1232 Park Street, Suite 201B
Paso Robles, CA 93446

DATE: 12/28/2018

INVOICE NO: 8925

TERMS Due on receipt

9200.0705

DATE	SERVICES	HOURS	AMOUNT
12/4/2018	Review proposed workplan and provide comment to D.Williams on same. (VCK)	1.2	420.00

Total	$420.00
Payments/Credits	$0.00
Balance Due	$420.00

MONTGOMERY
& ASSOCIATES

TIME REPORT

NAME: Timothy P. Leo

PROJECT NUMBER: 9200.0901

PERIOD: 12/1/2018 - 12/31/2018

City of Paso Robles Sustainable Management Criteria-M&A

DATE	TIME START	TIME STOP	HOURS	WORK DESCRIPTION
12/04/18	11:30	12:00	0.5	Coordinate with project team on SMC chapter status and schedule

TOTAL 0.5 HOURS

MONTGOMERY
& ASSOCIATES

TIME REPORT

NAME: Derrik Williams

PROJECT NUMBER: 9200.0901

PERIOD: 12/1/2018 - 12/31/2018

City of Paso Robles Sustainable Management Criteria-M&A

DATE	TIME START	TIME STOP	HOURS	WORK DESCRIPTION
12/03/18	10:00	13:30	3.5	Draft SMC chapter
12/18/18	10:30	12:00	1.5	Prepare Chapter 7
12/31/18	13:00	17:00	4.0	Prepare Chapter 7
	TOTAL		**9.0**	**HOURS**

MONTGOMERY
& ASSOCIATES

TIME REPORT

NAME: Colin P. Kikuchi

PROJECT NUMBER: 9200.0901

PERIOD: 12/1/2018 - 12/31/2018

City of Paso Robles — Sustainable Management Criteria-M&A

DATE	TIME START	TIME STOP	HOURS	WORK DESCRIPTION
12/04/18	13:30	14:30	1.0	Prepare written summary of methods used to compute measurable objectives at representative monitoring points

TOTAL 1.0 HOURS

MONTGOMERY & ASSOCIATES

TIME REPORT

NAME: Caryn S. Fogel

PROJECT NUMBER: 9200.1001

PERIOD: 12/1/2018 - 12/31/2018

City of Paso Robles Finalize GSP-M&A

DATE	TIME START	TIME STOP	HOURS	WORK DESCRIPTION
12/18/18	11:00	12:00	1.0	Review Paso Robles GSP reference documents
	14:00	14:30	0.5	Update Paso Robles reference documents
12/20/18	16:00	16:30	0.5	Review Paso Robles reference documents
	TOTAL		**2.0**	**HOURS**

MONTGOMERY
& ASSOCIATES

TIME REPORT

NAME: Tracie L. Jaeger

PROJECT NUMBER: 9200.1001

PERIOD: 12/1/2018 - 12/31/2018

City of Paso Robles Finalize GSP-M&A

DATE	TIME START	TIME STOP	HOURS	WORK DESCRIPTION
12/14/18	13:00	15:00	2.0	Review references and start review of abbreviations
	TOTAL		**2.0 HOURS**	

REVISED Draft

Paso Robles Subbasin
Groundwater Sustainability Plan
Chapter 6

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

February 14, 2019

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6 WATER BUDGETS

This chapter summarizes the estimated water budgets for the Paso Robles Subbasin, including information required by the SGMA Regulations and information that is important for developing an effective plan to achieve sustainability. In accordance with the SGMA Regulations §354.18, the GSP should include a water budget for the basin that provides an accounting and assessment of the total annual volume of surface water and groundwater entering and leaving the basin, including historical, current, and projected water budget conditions, and the change in the volume of water stored. Water budgets should be reported in graphical and tabular formats, where applicable.

6.1 Overview of Water Budget Development

This chapter is subdivided into three sections: (1) historical water budgets, (2) current water budgets, and (3) future water budgets. Within each section, a surface water budget and groundwater budget are presented. Water budgets were developed using the computer model of the Subbasin hydrogeologic conditions. Before presenting the water budgets, a brief overview of the models is presented. This chapter includes one appendix. The appendix provides additional information about the models and compares previously reported water budgets to water budgets developed for the GSP.

The water budgets reported herein are for the Subbasin defined in Section 1.2 and depicted on Figure 1-1. Previous water budgets reported for the Paso Robles groundwater Subbasin were for a larger area that included area within Monterey County and the Atascadero Subbasin. Because the Subbasin boundary was redefined by DWR, the area within Monterey County and the Atascadero Subbasin are no longer part of the Subbasin and therefore are not considered in water budgets reported in this section of the GSP. The revised Subbasin area results in water budget inflow components, outflow components, and estimates of sustainable yield that are different from previously reported water budgets.

In accordance with Section 354.18 of the SGMA Regulations, one integrated groundwater budget was developed for the combined inflows and outflows for the two principal aquifers - Alluvial Aquifer and Paso Robles Formation Aquifer – for each water budget period. Groundwater is pumped from both aquifers for beneficial use. Available groundwater elevation data suggest that most of the historic reduction in groundwater storage has occurred in the Paso Robles Formation Aquifer. Due to limitations in available groundwater elevation data for the Alluvial Aquifer, water budgets for this aquifer are more uncertain. Monitoring of hydrologic conditions in both aquifers will be conducted in the future to ensure that aquifer-specific sustainable management criteria are being achieved and undesirable results are being avoided.

Figure 6-1 presents a general schematic diagram of the hydrologic cycle. The water budgets include the components of the hydrologic cycle.

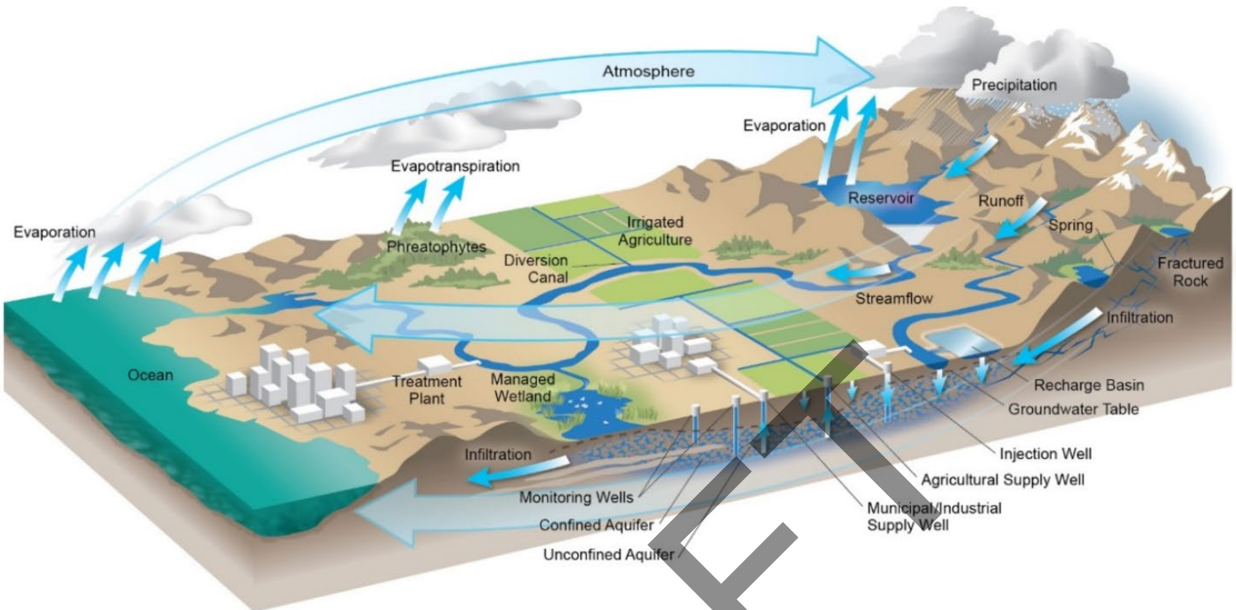

Figure 6-1. Hydrologic Cycle

A few components of the water budget can be measured, like streamflow at a gaging station or groundwater pumping from a metered well. Other components of the water budget are estimated, like recharge from precipitation or unmetered groundwater pumping. The water budget is an inventory of surface water and groundwater inflows (supplies) and outflows (demands) from the Subbasin, including:

Surface Water Inflows:

- Runoff of precipitation and reservoir releases into streams and rivers that enter the Subbasin from the surrounding watershed and that occurs inside the Subbasin
- Groundwater discharge to streams and rivers

Surface Water Outflows:

- River flows exiting the Subbasin
- Percolation of streamflow to the groundwater system
- Evaporation (negligible compared to other surface water outflows)

Groundwater Inflows:

- Recharge from precipitation
- Subsurface inflow (including percolation of irrigation return flow, precipitation, and streamflow outside the Subbasin)
- Irrigation return flow (water not consumed by crops)
- Percolation of surface water from streams
- Infiltration of treated wastewater from disposal ponds

Groundwater Outflows:

- Evapotranspiration
- Groundwater pumping
- Discharge to streams and rivers
- Subsurface outflow to the next downgradient groundwater basin

The difference between inflows and outflows is equal to the change in storage.

6.2 Water Budget Data Sources and Basin Model

Water budgets for the Paso Robles Subbasin were estimated using an integrated system of three hydrologic models (collectively designated herein as the "basin model"), including:

1. A watershed model
2. A soil water balance model
3. A groundwater flow model

The groundwater model was originally developed by Fugro (2005). The watershed and soil water balance models were developed and integrated with an updated version of the groundwater model by Geoscience Support Services, Inc. (GSSI) (GSSI, 2014 and 2016). These models were developed for San Luis Obispo Flood Control and Water Conservation District (SLOFCWCD). The original models are documented in the following reports:

- *Final Report, Paso Robles Groundwater Basin Study Phase II, Numerical Model Development, Calibration, and Application*: Fugro, February 2005
- *Paso Robles Groundwater Basin Model Update: Geoscience Support Services, Inc.*, December 2014

- *Refinement of the Paso Robles Groundwater Basin Model and Results of Supplemental Water Supply Options Predictive Analysis: Geoscience Support Services, Inc.*, December 2016

The 2016 version of the basin model was updated for the GSP. The update included incorporating hydrologic data for the period 2012 through 2016 into the models. Appendix D includes a brief summary of the model update process, including:

- A summary of data sources used for the update (Table D-1)
- A summary of modifications made to the basin model to address computational refinements, data processing issues, and conceptual application of the model codes
- A comparison of the water budgets from the updated model and the original 2016 GSSI model.

The updated versions of the basin models are referred to herein collectively as the "GSP model".

Numerous sources of raw data were used to update the basin models for the GSP. Examples of raw data include reported pumping rates from the City of Paso Robles, precipitation data obtained from weather stations in the Subbasin, and crop acreage from the office of the San Luis Obispo County Agricultural Commissioner, among many others. Data sources are listed in Table D-1. Raw data were compiled, processed, and used to develop model input files. Model results were used to develop estimates of the individual inflow and outflow components of the surface water and groundwater budgets. Thus, all of the estimated flow components herein were extracted from the GSP model.

6.2.1 Model Assumptions and Uncertainty

The GSP model is based on available hydrogeologic and land use data from the past several decades, previous studies of Subbasin hydrogeologic conditions, and earlier versions of the basin models. The GSP models give insight into how the complex hydrologic processes are operating in the Subbasin. During previous studies, available data and a peer-review process were used to calibrate the basin model to Subbasin hydrogeologic conditions. Results of the previous calibration process demonstrated that the model-simulated groundwater and surface water flow conditions were similar to observed conditions. After updating for the GSP, the calibration of the GSP model was reviewed. Results of the review indicated that the GSP model was sufficiently calibrated for use in the GSP.

Projections made with the GSP model have uncertainty due to limitations in available data and limitations from assumptions made to develop the models. This uncertainty is typical of all models, and its effect on projections made with the models is well understood. Model uncertainty has been considered when developing and using the reported GSP water budgets for developing sustainability management actions and projects (Chapter 9).

During early implementation of the GSP, additional data will be collected to refine Subbasin understanding and recalibrate the GSP model. New hydrologic data and the recalibrated model will be used to adaptively implement sustainability management actions and projects to ensure that progress toward sustainability goals is being achieved.

6.3 Historical Water Budget

The SGMA Regulations require that the historical surface water and groundwater budget be based on at least the most recent 10 years of data. For the Paso Robles Subbasin GSP, the period 1981 to 2011 was selected as the time period for the historical water budget (referred to as the historical base period) because it is long enough to capture typical climate variations, it corresponds to the period simulated in the basin model, and it ends at about the time the recent drought period began. Estimates of the surface water and groundwater inflow and outflow, and changes in storage for the historical base period are provided below.

6.3.1 Historical Surface Water Budget

The SGMA Regulations (§354.18) require development of a surface water budget for the GSP. The surface water budget quantifies important sources of surface water and evaluates their historical and future reliability. The water budget Best Management Practice (BMP) document states that surface water sources should be identified as one of the following (DWR, 2016):

- Central Valley Project
- State Water Project
- Colorado River Project
- Local imported supplies
- Local supplies

The Paso Robles Subbasin relies on two of these surface water source types: local imported supplies and local supplies.

6.3.1.1 Historical Local Imported Supplies

During the historical base period, local imported water supplies were not used in the Subbasin. Use of local imported supplies began in 2014; information about these supplies is presented in Section 6.4 – Future Water Budget.

6.3.1.2 Historical Local Supplies

Local surface water supplies include surface water flows that enter the Subbasin from precipitation runoff within the watershed, Salinas River inflow to the Subbasin (including releases from the Salinas Reservoir), Nacimiento River inflow to the Subbasin (including releases from Nacimiento Reservoir), and discharge of groundwater to streams from the Alluvial Aquifer. Table 6-1 summarizes the annual average, minimum, and maximum values for these inflows.

Table 6-1. Estimated Historical (1981-2011) Annual Surface Water Inflows to Subbasin

Surface Water Inflow Component	Average	Minimum	Maximum
Nacimiento River Inflow to Subbasin	214,400	5,500	734,100
Precipitation Runoff within Watershed	96,900	400	606,900
Salinas River Inflow to Subbasin	41,800	1,600	179,900
Groundwater Discharge to Rivers and Streams from Alluvial Aquifer	7,300	4,300	11,800
Total [1]	360,400	13,700	1,198,600

Note: All values in AF

(1) The total minimum and maximum inflow rates are not equal to the sum of the minimum and maximum rates for the inflow components, because the water year corresponding to the minimum and maximum inflow rates differs across the different inflow components.

The estimated annual average total inflow from these sources over the historical base period is about 360,400 AF. The largest component of this average inflow is releases and flow in the Nacimiento River. While average inflows are large from the Nacimiento River, nearly all of this inflow leaves the Subbasin as surface water outflow because the length of the Nacimiento River within the Subbasin is short. The large difference between the minimum and maximum inflows reflects the difference between dry and wet years in the Subbasin. The sum of the minimum and maximum inflows will not necessarily equal the tally of individual inflows because the minimums and maximums of the individual inflows do not always occur in the same year.

6.3.1.3 Historical Surface Water Outflows

The estimated annual average total surface water outflow leaving the Subbasin as flow in the Salinas River, flow in the Nacimiento River, and percolation into the groundwater system over the historical base period is summarized in Table 6-2.

Table 6-2. Estimated Historical (1981-2011) Annual Surface Water Outflows from Subbasin

Surface Water Outflow Component	Average	Minimum	Maximum
Salinas River Outflow from Subbasin	119,100	5,300	646,300
Nacimiento River Outflow from Subbasin	214,400	5,500	734,000
Percolation of Surface Water to Groundwater	26,900	2,000	126,000
Total [1]	360,400	13,700	1,198,600

Note: All values in acre-feet (AF)

(1) The total minimum and maximum outflow rates are not equal to the sum of the minimum and maximum rates for the outflow components, because the water year corresponding to the minimum and maximum inflow rates differs across the different inflow components.

The estimated annual average total outflow from these sources over the historical base period is about 360,400 AF. Of this 360,400 AFY, approximately 26,900 AFY of the outflow is percolation from streams into the groundwater system. Of this 26,900 AFY of percolation, 7,300 AFY returns to streamflow as groundwater discharge.

6.3.1.4 Historical Surface Water Budget

Figure 6-2 summarizes the historical water budget for the Subbasin.

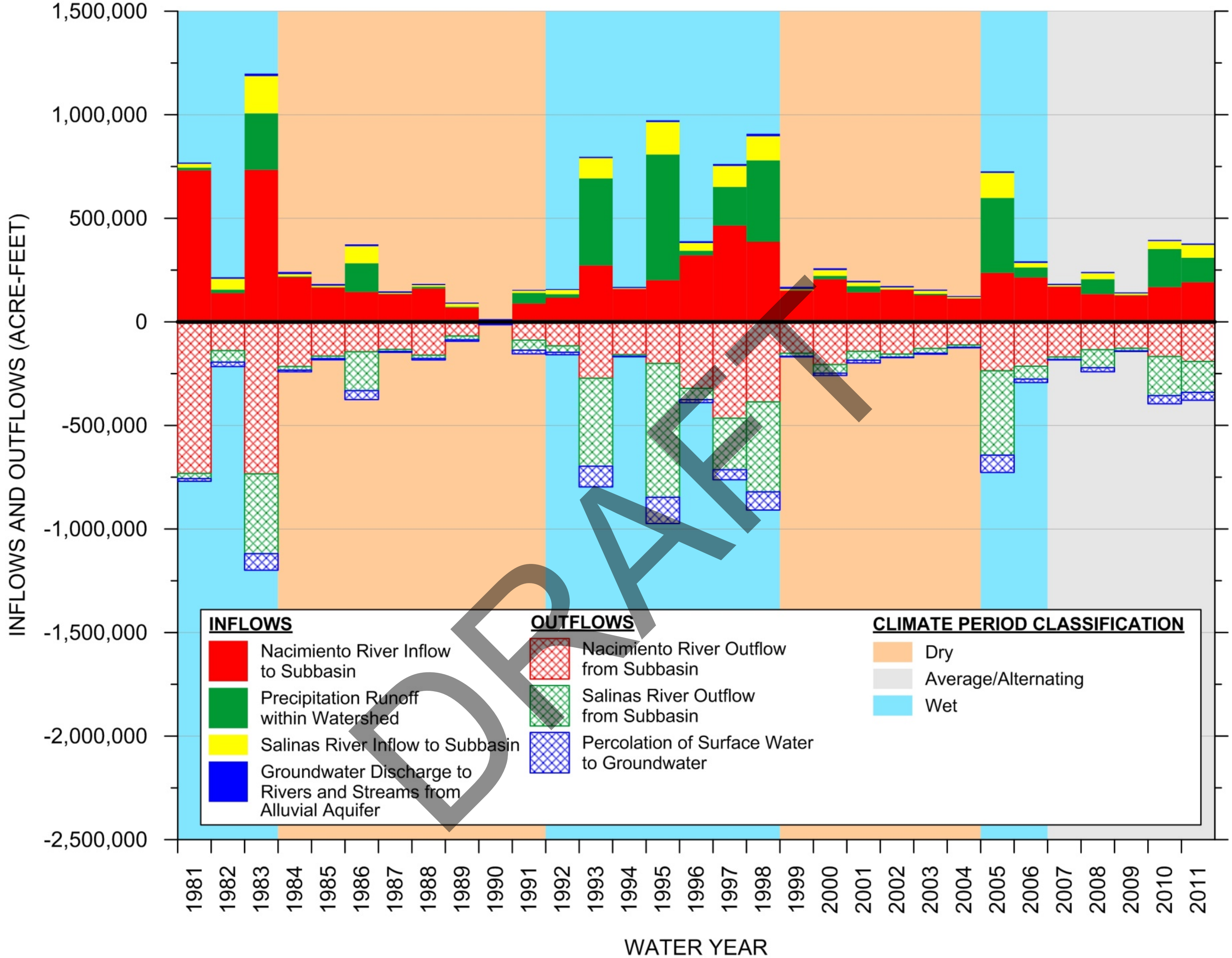

Figure 6-2. Historical (1981-2011) Surface Water Inflows and Outflows

This graph shows the strong correlation between precipitation and streamflow in the Subbasin. In wet periods, shown with a blue background, surface water inflows and outflows are large. In contrast, in dry periods that are shown with an orange background, surface water inflows and outflows are small. As shown on the graph, several years during the historical base period had total surface water inflows greater than 500,000 AFY. Assuming diversion permits could be obtained, future high flow years may provide opportunities to capture and use excess storm water as a new water supply in the Subbasin. This concept is discussed in more detail in Chapter 9 – Projects and Management Actions.

6.3.2 Historical Groundwater Budget

Groundwater supplied most of the water used in the Subbasin over the historical base period. The historical groundwater budget includes a summary of the estimated groundwater inflows, groundwater outflows, and change in groundwater in storage.

6.3.2.1 Historical Groundwater Inflows

Groundwater inflow components include streamflow percolation, agricultural irrigation return flows, deep percolation of direct precipitation, subsurface inflow into the Subbasin, wastewater pond leakage, and urban irrigation return flow. Estimated annual groundwater inflows for the historical base period are summarized in Table 6-3. Values reported in the table were estimated or derived from the basin models using data sources reported in Table D-1 in Appendix D.

Table 6-3. Estimated Historical (1981-2011) Annual Groundwater Inflows to Subbasin

Groundwater Inflow Component [1]	Average	Minimum	Maximum
Streamflow Percolation	26,900	2,000	126,000
Agricultural Irrigation Return Flow	17,800	10,700	29,100
Deep Percolation of Direct Precipitation	12,000	300	45,400
Subsurface Inflow into Subbasin	10,100	4,900	14,300
Wastewater Pond Leakage	3,400	2,400	4,400
Urban Irrigation Return Flow	1,200	300	2,200
Total [2]	71,400	25,700	201,700

Note: All values in acre-feet (AF)

(1) – Percolation from septic systems is not directly accounted for because it is subtracted from the total estimated rural-domestic pumping to simulate a net rural-domestic pumping amount.

(2) - The total minimum and maximum inflow rates are not equal to the sum of the minimum and maximum rates for the inflow components, because the water year corresponding to the minimum and maximum inflow rates differs across the different inflow components.

For the historical base period, estimated total average groundwater inflow ranged from 25,700 AFY to 201,700 AFY, with an average inflow of 71,400 AFY. The largest groundwater inflow component is streamflow percolation, which accounts for approximately 38% of the total average inflow. Streamflow percolation, agricultural irrigation return flow, and deep percolation of direct precipitation account for approximately 79% of the estimated total annual average inflow to the Subbasin. The large difference between the minimum and maximum inflows from streamflow percolation and direct precipitation reflect the variations in precipitation over the historical base period.

6.3.2.2 Historical Groundwater Outflows

Groundwater outflow components include total groundwater pumping from all water use sectors, groundwater discharge to streams and rivers from the Alluvial Aquifer, subsurface flow out of the Subbasin, and riparian evapotranspiration. Estimated annual groundwater outflows for the historical base period are summarized in Table 6-4.

Table 6-4. Estimated Historical (1981-2011) Annual Groundwater Outflow from Subbasin

Groundwater Outflow Component	Average	Minimum	Maximum
Total Groundwater Pumping	72,400	48,200	102,900
Groundwater Discharge to Streams and Rivers from Alluvial Aquifer	7,300	4,300	11,800
Subsurface Flow Out of Subbasin	2,600	2,300	3,000
Riparian Evapotranspiration	1,700	1,700	1,700
Total [1]	84,000	62,300	112,700

Note: All values in acre-feet (AF)

(1) - The total minimum and maximum outflow rates are not equal to the sum of the minimum and maximum rates for the outflow components, because the water year corresponding to the minimum and maximum outflow rates differs across the different outflow components.

The largest groundwater outflow component from the Subbasin is groundwater pumping. Estimated annual groundwater pumping by water use sector for the historical base period is summarized in Table 6-5.

Table 6-5. Estimated Historical (1981-2011) Annual Groundwater Pumping by Water Use Sector from Subbasin

Water Use Sector	Average	Minimum	Maximum
Agricultural	65,300	40,600	95,800
Municipal	3,200	1,700	6,000
Rural-Domestic [1]	2,500	1,700	3,400
Small Commercial	1,400	1,200	1,700
Total [2]	72,400	48,200	102,900

Notes: All values in acre-feet (AF)

(1) Assumed to be net amount of pumping based on an analysis conducted by GSSI (2016). Net pumping was computed as total pumping amount minus septic return flow.

(2) The total minimum and maximum pumping rates are not equal to the sum of the minimum and maximum rates for the water use sectors, because the water year corresponding to the minimum and maximum pumping rates differs across the different water use sectors.

Agricultural pumping was the largest component of total groundwater pumping, accounting for about 90% of total pumping over the historical base period. Municipal, rural-domestic, and small commercial pumping account for 4%, 4%, and 2%, respectively, of total average annual pumping over the historical base period.

6.3.2.3 Historical Groundwater Budget and Changes in Groundwater Storage

Groundwater inflows and outflows for the historical base period are summarized on Figure 6-3. This graph shows groundwater inflow and outflow components for every year of the historical period. Inflow components are graphed above the zero line and outflow components are graphed below the zero line. Groundwater outflow by pumping (green bars) includes pumping from all water use sectors (Table 6-5).

Figure 6-4 shows annual and cumulative change in groundwater storage during the historical base period. Annual increases in groundwater storage are graphed above the zero line and annual decreases in groundwater storage are graphed below the zero line. The red line shows the cumulative change in groundwater storage over the historical base period.

The GSP uses the best available information to quantify the water budget for the Subbasin while recognizing the limitations inherent from existing data gaps. The water budget identifies and tracks changing inflows and outflows to the Subbasin and therefore is an important tool for local water resources management. The GSP contains a plan to gather more and better data in the future, which will be used to further refine the water budget. The GSP is designed to adapt to an increasing data set and expanding understanding of basin conditions and water budget.

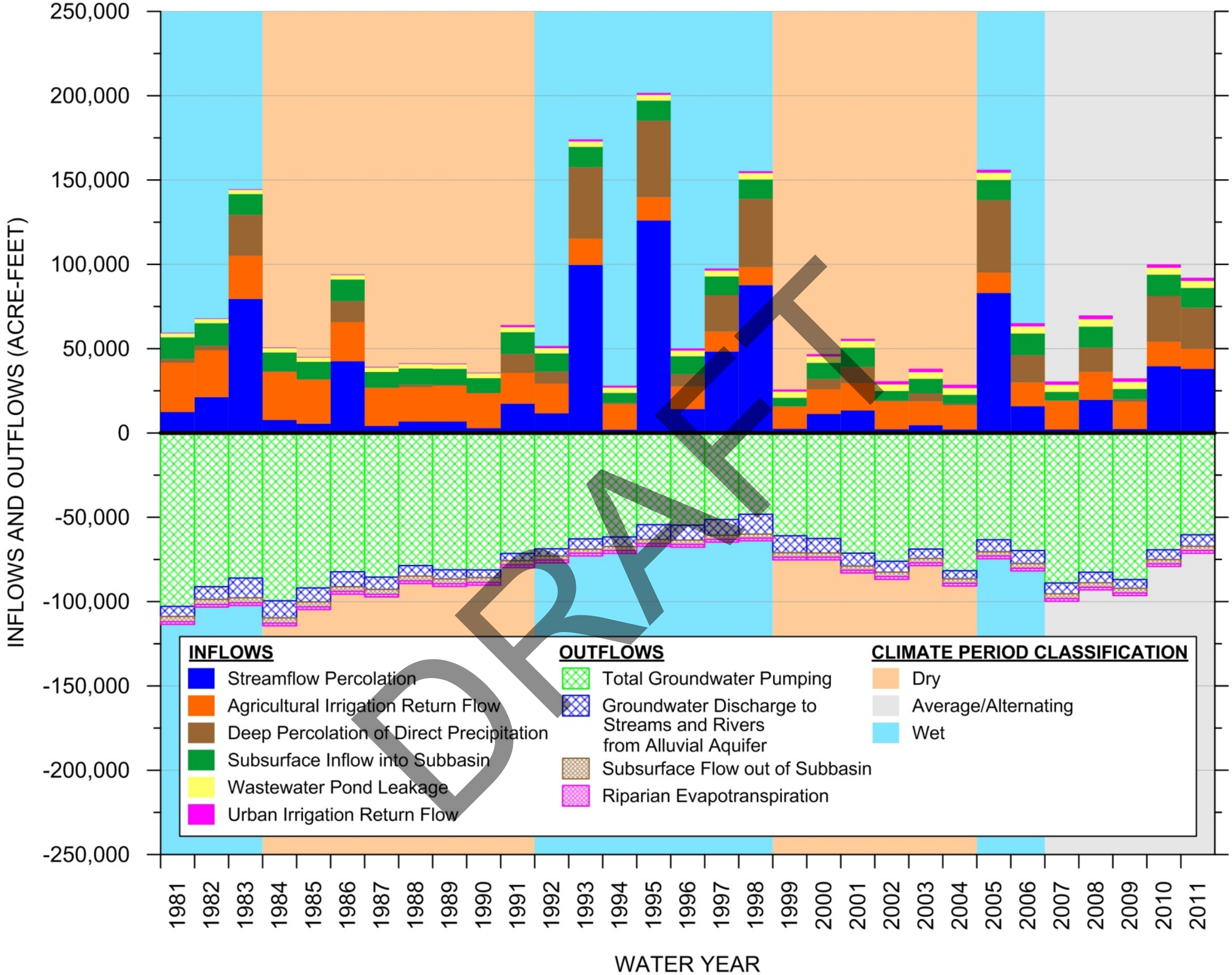

Figure 6-3. Historical (1981-2011) Groundwater Inflows and Outflows

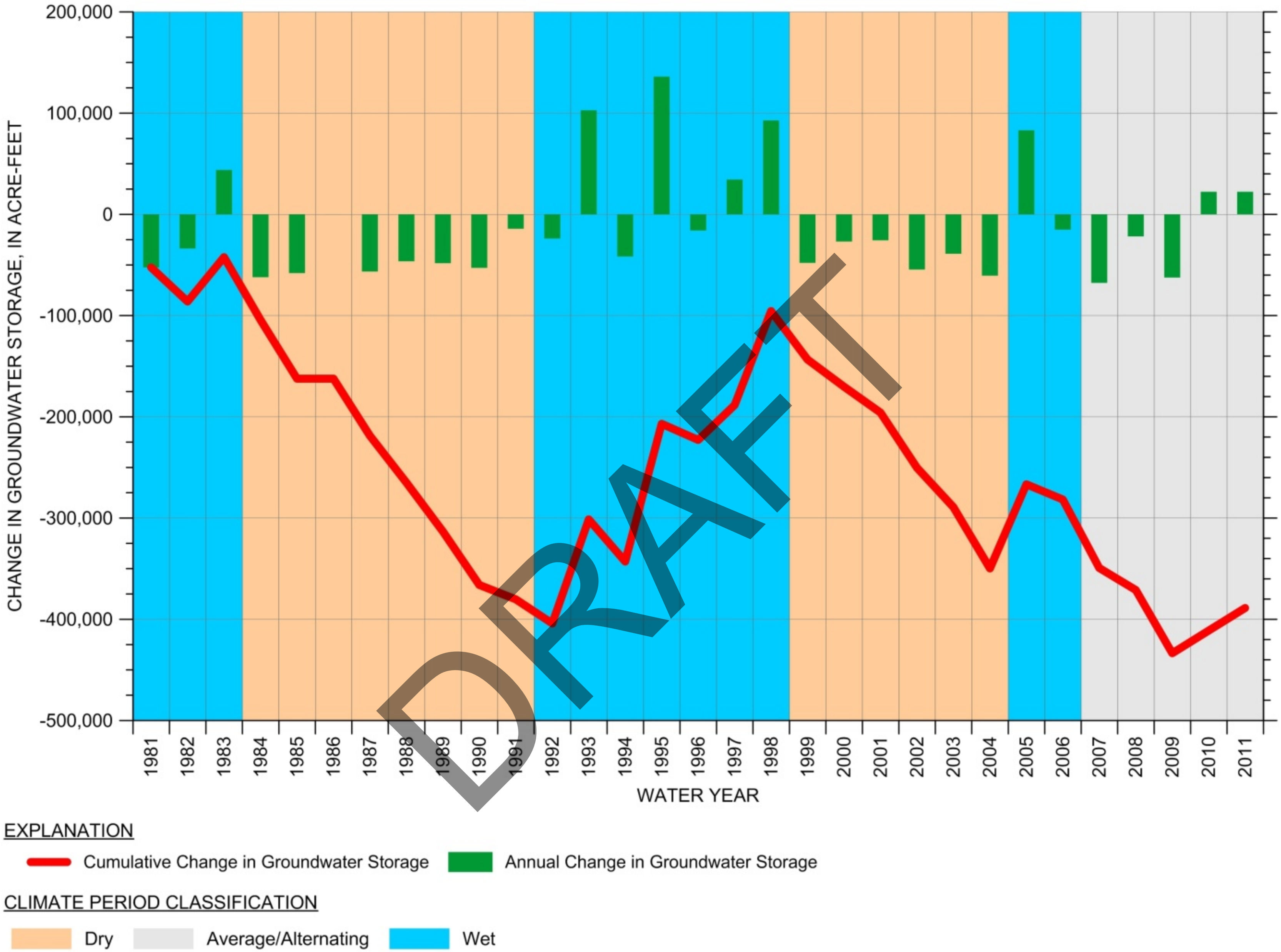

Figure 6-4. Historical (1981-2011) Annual and Cumulative Change in Groundwater Storage

The historical groundwater budget is strongly influenced by the amount of precipitation. During the historical base period, dry conditions prevailed from 1984 through 1991 and 1999 through 2004, as depicted by the orange areas on Figure 6-3 and Figure 6-4. During these dry periods, the amounts of recharge and streamflow percolation were relatively low and the amount of pumping was relatively high. The net result was a loss of groundwater from storage. In contrast, wet conditions prevailed in the early 1980s, 1992 through 1998, and 2005 and 2006, as shown by blue areas on Figure 6-3 and Figure 6-4. During these wet periods, the amounts of recharge and streamflow percolation were relatively high and the amount of pumping was relatively low. The net result was a gain of groundwater in storage. The period from 2007 through 2011 had generally alternative years of average precipitation. During this period, the amounts of recharge and streamflow percolation were average and the amount of groundwater pumping was relatively high. The net result was a loss of groundwater from storage.

The historical groundwater budget is also influenced by the amount of groundwater pumping. Over the historical base period, the total amount of groundwater pumping showed two distinct trends (Figure 6-3). From the early 1980s through the late 1990s, groundwater pumping declined from about 100,000 AFY to about 50,000 AFY. In general, this decline in groundwater pumping corresponded to a period when irrigation of alfalfa and pasture acreage declined and irrigated vineyard acreage increased (Fugro, 2002). The transition from alfalfa and pasture to vineyard resulted in a net decrease in groundwater pumping because the irrigation demand of vineyards is less than alfalfa and pasture. This decrease in pumping contributed to the increase in groundwater in storage during the 1990s. After the late 1990s, groundwater pumping increased to about 100,000 AFY in 2007, largely due to continued expansion of irrigated vineyard acreage. The increase in groundwater pumping during this period contributed to the reductions in groundwater in storage that occurred after the late 1990s.

Over the 31 year historical base period, a net loss of groundwater storage of about 390,000 AF occurred. The annual average groundwater storage loss was approximately 12,500 AF. The average groundwater storage loss of 12,500 AFY is about 18% of the average total groundwater inflow of 71,400 AFY (Table 6-3) and about 15% of the average total groundwater outflow of 84,000 AFY (Table 6-4).

6.3.2.4 Historical Sustainable Yield of the subbasin

The computed long-term depletion of groundwater in storage indicates that total groundwater pumping from all water use sectors exceeded the total amount of recharge in the Subbasin from 1981 through 2011; this depletion is consistent with observed groundwater elevation declines (for example, see groundwater elevation change maps and hydrographs in Chapter 5). As summarized in Table 6-5, total groundwater pumping averaged approximately 72,400 AFY during the historical base period. In accordance with Section 354.18(b)(7) of the SGMA Regulations, a sustainable yield for the Subbasin for the historical base period was estimated. Sustainable yield of the Subbasin was computed by subtracting the average groundwater storage deficit of 12,500 AFY from the total average amount of groundwater pumping. In this case, the historical sustainable yield of the Subbasin for the historical base period is about 59,900 AFY. This estimate of sustainable yield reflects historical climate, hydrologic and water resource conditions and provides insight into the amount of groundwater pumping that could be sustained to maintain a balance between groundwater inflows and outflows. However, it differs from estimates of future sustainable yield, which will be developed for representative average future climate and hydrologic conditions and will be used to plan management actions and projects needed to avoid undesirable results under SGMA.

6.4 Current Water Budget

The SGMA Regulations require that the current surface water and groundwater budget be based on the most recent hydrology, water supply, water demand, and land use information. For the Paso Robles Subbasin GSP, the period 2012 to 2016 was selected as the time period for the current water budget. The current water budget period corresponds to a drought period when the average annual precipitation averaged about 62% of the historical average annual precipitation and the average streamflow percolation was 10% of the historical average percolation. As a result, the current water budget period represents a more extreme condition in the basin and is not appropriate for sustainability planning in the Subbasin. Estimates of the surface water and groundwater inflow and outflow, and changes in storage for the current water budget period are provided below.

6.4.1 Current Surface Water Budget

The current surface water budget quantifies important sources of surface water. Similar to the historical surface water budget, the current surface water budget includes two surface water source types: local imported supplies and local supplies.

6.4.1.1 Current Local Imported Supplies

As reported in the City of Paso Robles' 2016 Urban Water Management Plan, the most significant source of imported surface water in the Paso Robles Subbasin is the City's entitlement for Nacimiento water through a SLOFCWCD contract (Todd Groundwater, 2016). The total Nacimiento entitlement is about 6,500 AFY. Use of the Nacimiento water by the City began in 2014. Recently the Subbasin has begun to receive relatively small deliveries of up to 100 AFY of State Water Project water to Shandon CSA 16 for residential use. Currently, the City can treat up to about 2,700 AFY of Nacimiento water and deliver it for potable use (Todd Groundwater, 2016). Approximately another 270 AFY of Nacimiento water can be discharged to the Salinas River and recovered by a dedicated recovery well. In times of drought, Nacimiento water can be discharged to the Salinas River to improve reliability of the City's river recovery wells.

Only a small portion of the total water demand in the Subbasin during the current water budget period was met by the City's entitlement of imported surface water from Nacimiento Reservoir. According to records provided by the City, the amounts of Nacimiento water used in 2014, 2015, and 2016 were 227, 622, and 799 AF, respectively. The limited use is not an indication of the reliability of Nacimiento water, but rather a choice by the City regarding how to operate its water supply portfolio. Nacimiento water is expected to be a stable water supply given the favorable contractual priority of SLOFCWCD for the reservoir supply (Todd Groundwater, 2016).

Given the limited amount of imported Nacimiento water used compared to the amount of other local surface water supplies, the Nacimiento water supply is not aggregated into the surface water budget discussed below.

6.4.1.2 Current Local Supplies

Local surface water supplies include surface water flows that enter the Subbasin from precipitation runoff within the watershed, Salinas River inflow to the Subbasin (including releases from the Salinas Reservoir), Nacimiento River inflow to the Subbasin (including releases from Nacimiento Reservoir), and discharge of groundwater to streams from the Alluvial Aquifer. Table 6-6 summarizes the annual average, minimum, and maximum values for these inflows.

Table 6-6. Estimated Current (2012-2016) Annual Surface Water Inflows to Subbasin

Surface Water Inflow Component	Average	Minimum	Maximum
Precipitation Runoff	2,900	1,300	7,500
Salinas Reservoir Releases to Salinas River	6,600	5,200	8,500
Nacimiento Reservoir Releases	73,200	29,400	163,600
Groundwater Discharge to Rivers and Streams	4,300	3,000	6,100
Total [1]	87,000	45,600	180,200

Note: All values in acre-feet (AF)

(1) The total minimum and maximum inflow rates are not equal to the sum of the minimum and maximum rates for the inflow components, because the water year corresponding to the minimum and maximum inflow rates differs across the different inflow components.

The estimated average total inflow from both precipitation runoff and reservoir releases over the current water budget period was approximately 87,000 AFY, or 25% of the 360,400 AFY over the historical base period. Approximately 84% of the local surface water supply was from Nacimiento Reservoir releases, most of which flows out of the Subbasin as surface flow. As a result, Nacimiento River flows do not result in appreciable amounts of surface water percolation to groundwater. If Nacimiento releases are not considered in the surface water inflows, surface water inflows during the current water budget period were less than 10% of the surface water inflows for the historical base period. The substantial reduction in surface water inflows reflects the drought conditions that prevailed during the current water budget period.

6.4.1.3 Current Surface Water Outflows

The estimated annual average, minimum, and maximum surface water outflow leaving the Subbasin as flow in the Salinas River, flow in the Nacimiento River, and percolation into the groundwater system over the current base period is summarized in Table 6-7.

Table 6-7. Estimated Current (2012-2016) Annual Surface Water Outflows from Subbasin

Surface Water Outflow Component	Average	Minimum	Maximum
Salinas River Flow	11,100	8,500	14,100
Nacimiento River Flow	73,200	29,400	163,300
Percolation of Surface Water to Groundwater	2,700	2,100	4,100
Total [1]	87,000	45,600	180,200

Note: All values in acre-feet (AF)

(1) The total minimum and maximum outflow rates are not equal to the sum of the minimum and maximum rates for the outflow components, because the water year corresponding to the minimum and maximum outflow rates differs across the different outflow components.

Reductions in surface water outflow for the current water budget period were similar to those reported above for the surface water inflows.

6.4.1.4 Current Surface Water Budget

Figure 6-5 summarizes the current surface water budget for the Subbasin. Figure 6-5 is on the same scale as Figure 6-2 and shows the effects of the drought conditions that prevailed during the period 2012 through 2016. During this period, precipitation was well below average, which resulted in very little surface water flow.

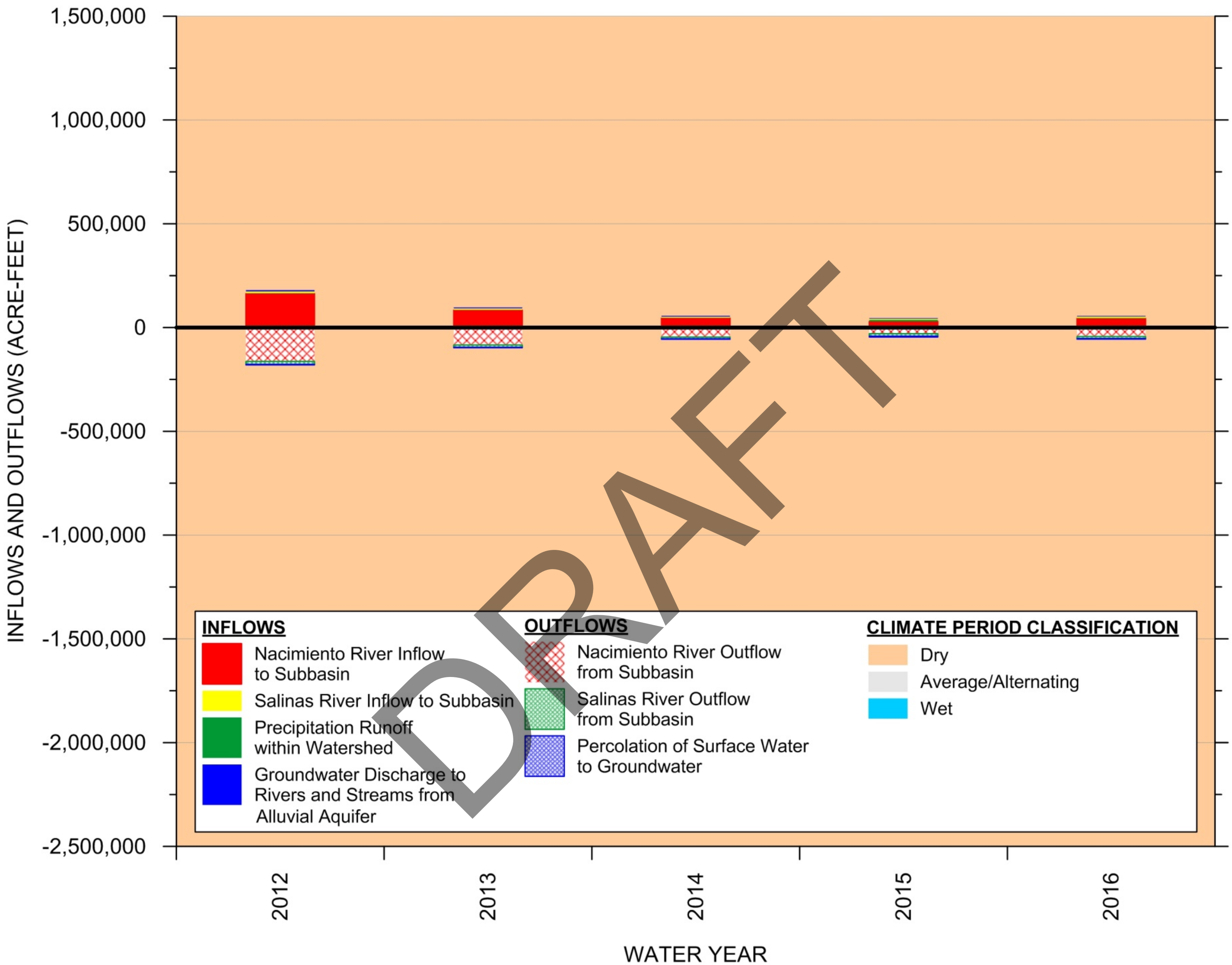

Figure 6-5. Current Surface Water Inflows and Outflows

6.4.2 Current Groundwater Budget

Groundwater supplied most of the water used in the basin during the current water budget period. The current water budget includes a summary of the estimated groundwater inflows, groundwater outflows, and change in groundwater in storage.

6.4.2.1 Current Groundwater Inflows

Groundwater inflow components include streamflow percolation, agricultural irrigation return flows, deep percolation of direct precipitation, subsurface inflow into the Subbasin, wastewater pond leakage, and urban irrigation return flow. Estimated annual groundwater inflows for the current water budget period are summarized in Table 6-8.

Table 6-8. Estimated Current (2012-2016) Annual Groundwater Inflows to Subbasin

Groundwater Inflow Component [1]	Average	Minimum	Maximum
Streamflow Percolation	2,700	2,100	4,100
Agricultural Irrigation Return Flow	13,100	12,400	13,800
Deep Percolation of Direct Precipitation	1,400	500	3,800
Subsurface Inflow into Subbasin	4,900	4,400	6,000
Wastewater Pond Leakage	4,700	4,600	4,900
Urban Irrigation Return Flow	2,100	2,000	2,200
Total [2]	28,900	27,500	33,100

Note: All values in acre-feet (AF)

(1) – Percolation from septic systems is not directly accounted for because it is subtracted from the total estimated rural-domestic pumping to simulate a net rural-domestic pumping amount.

(2) - The total minimum and maximum inflow rates are not equal to the sum of the minimum and maximum rates for the inflow components, because the water year corresponding to the minimum and maximum inflow rates differs across the different inflow components.

For the current water budget period, estimated total average groundwater inflow ranged from 27,500 AFY to 33,100 AFY, with an average inflow of 28,900 AFY. Notable observations from the summary of groundwater inflows for the current water budget period included:

- Average total inflow during the current water budget period was about 40% of the historical base period.
- Unlike the historical base period, when the largest inflow component was streamflow percolation, the largest groundwater inflow component for the current water budget is

agricultural irrigation return flow, which accounts for approximately 45% of the total average inflow.

- The relatively small difference between the minimum and maximum inflows reflects the drought condition that prevailed during the current water budget period, when precipitation and runoff were continuously low.
- Total annual average streamflow percolation in the current water budet period was approximately 10% of the streamflow percolation in the historical base period. This reflects the very low streamflows during the drought. This has a significant impact on the groundwater basin because streamflow percolation was the most significant source of groundwater recharge during the historical period.
- Total annual average recharge from direct precipitation for the current water budget period was about 12% of the recharge from direct precipitation for the historical base period.

6.4.2.2 Current Groundwater Outflows

Groundwater outflow components include total groundwater pumping from all water use sectors, groundwater discharges to streams and rivers from the Alluvial Aquifer, subsurface flow out of the Subbasin, and riparian evapotranspiration. Total groundwater pumping includes all water use sectors. Estimated annual groundwater outflows for the current water budget period are summarized in Table 6-9.

Table 6-9. Estimated Current (2012-2016) Annual Groundwater Outflow from Subbasin

Groundwater Outflow Component	Average	Minimum	Maximum
Total Groundwater Pumping	85,800	73,900	101,200
Discharge to Streams and Rivers from Alluvial Aquifer	4,300	3,000	6,100
Subsurface Flow Out of Subbasin	2,500	2,300	2,600
Riparian Evapotranspiration	1,700	1,700	1,700
Total [1]	94,300	81,200	109,300

Note: All values in acre-feet (AF)

(1) - The total minimum and maximum outflow rates are not equal to the sum of the minimum and maximum rates for the outflow components, because the water year corresponding to the minimum and maximum outflow rates differs across the different outflow components.

For the current water budget period, estimated total average groundwater outflows ranged from 81,200 AFY to 109,300 AFY, with an average annual outflow of 94,300 AF. Notable observations from a comparison of the historical (Table 6-4) and current groundwater outflows include:

- Total annual average groundwater pumping was about 19% higher during the current water budget period.
- Groundwater discharge from the Alluvial Aquifer to streams was about 40% lower during the current water budget period, reflecting lower precipitation and lower groundwater levels.

The largest groundwater outflow component from the Subbasin in the current water budget period is pumping. Estimated annual groundwater pumping by water use sector for the current water budget period is summarized in Table 6-10.

Table 6-10. Estimated Current (2012-2016) Annual Groundwater Pumping by Water Use Sector

Water Use Sector	Average	Minimum	Maximum
Agricultural	77,000	65,600	92,300
Municipal	3,800	3,200	4,300
Rural-Domestic [1]	3,500	3,400	3,600
Small Commercial	1,500	1,500	1,500
Total [2]	85,800	73,900	101,200

Note: All values in acre-feet (AF)

(1) Assumed to be net amount of pumping based on an analysis conducted by GSSI (2016). Net pumping was computed as total pumping amount minus septic return flow.

(2) The total minimum and maximum pumping rates are not equal to the sum of the minimum and maximum rates for the water use sectors, because the water year corresponding to the minimum and maximum pumping rates differs across the different water use sectors.

For the current water budget period, estimated total average groundwater pumping ranged from 73,900 AFY to 101,200 AFY, with an average pumping of 85,800 AFY. Agricultural pumping was the largest component of total groundwater pumping and accounts for about 90% of total pumping during the current water budget period. Municipal, rural-domestic, and small commercial pumping account for 4%, 4%, and 2%, respectively, of total average pumping during the current water budget period.

Notable observations from a comparison of the historical (Table 6-5) and current total annual average groundwater pumping include:

- Total annual average agricultural groundwater pumping was about 18% higher during the current water budget period when compared to the historical period (increase of 11,700 AFY)
- Total annual average rural-domestic groundwater pumping was about 40% higher during the current water budget period (increase of 1,000 AFY)

6.4.2.3 Current Groundwater Budget and Change in Groundwater Storage

Groundwater inflows and outflows for the current base period are summarized on Figure 6-6. This graph shows inflow and outflow components for every year of the current water budget period. Inflow components are graphed above the zero line and outflow components are graphed below the zero line. Groundwater outflow by pumping (green bars) includes pumping from all water use sectors (Table 6-10).

Figure 6-7 shows annual and cumulative change in groundwater storage during the current water budget period. Annual decreases in groundwater storage are graphed below the zero line. The red line shows the cumulative change in groundwater storage over the historical base period.

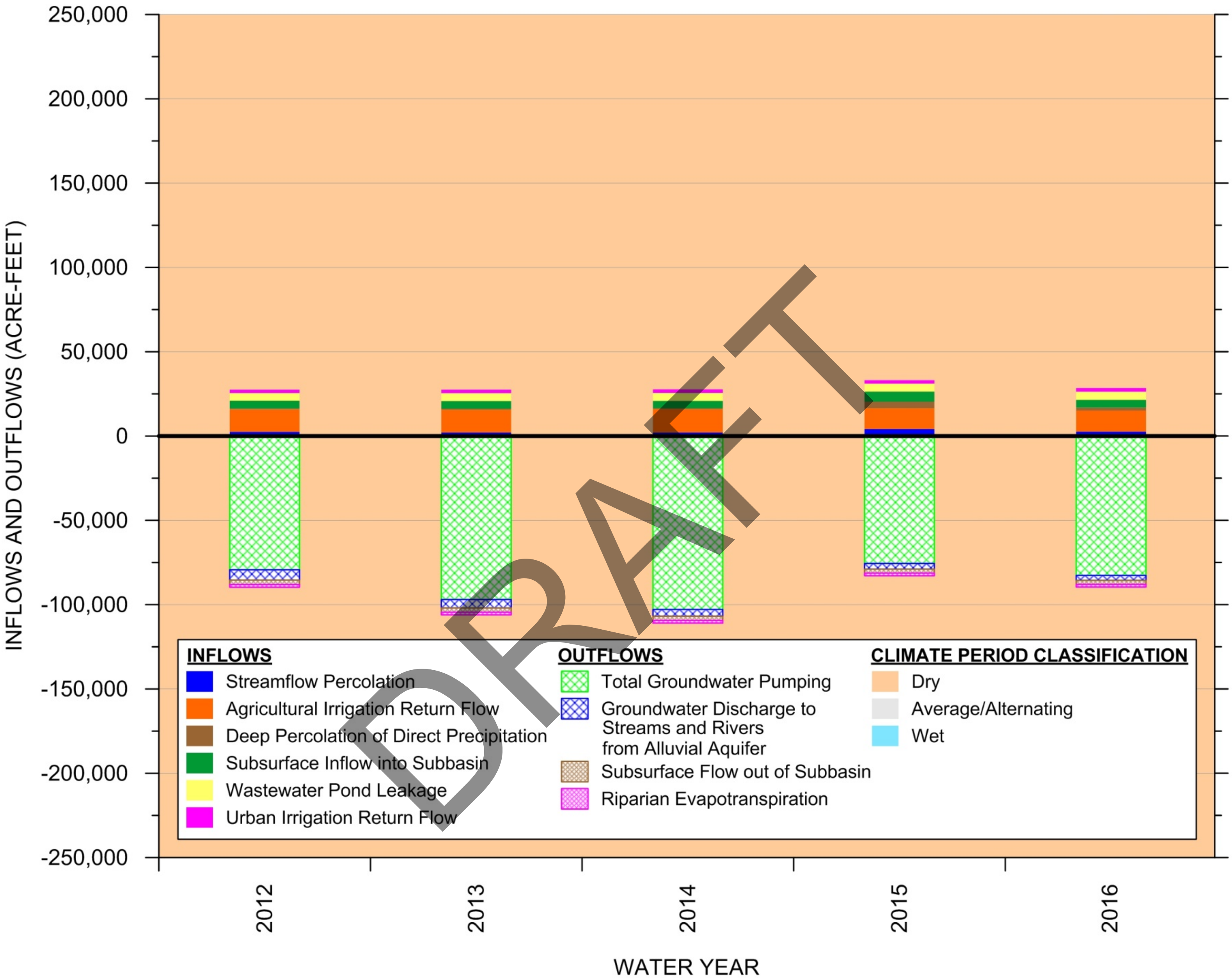

Figure 6-6. Current (2012-2016) Groundwater Inflows and Outflows

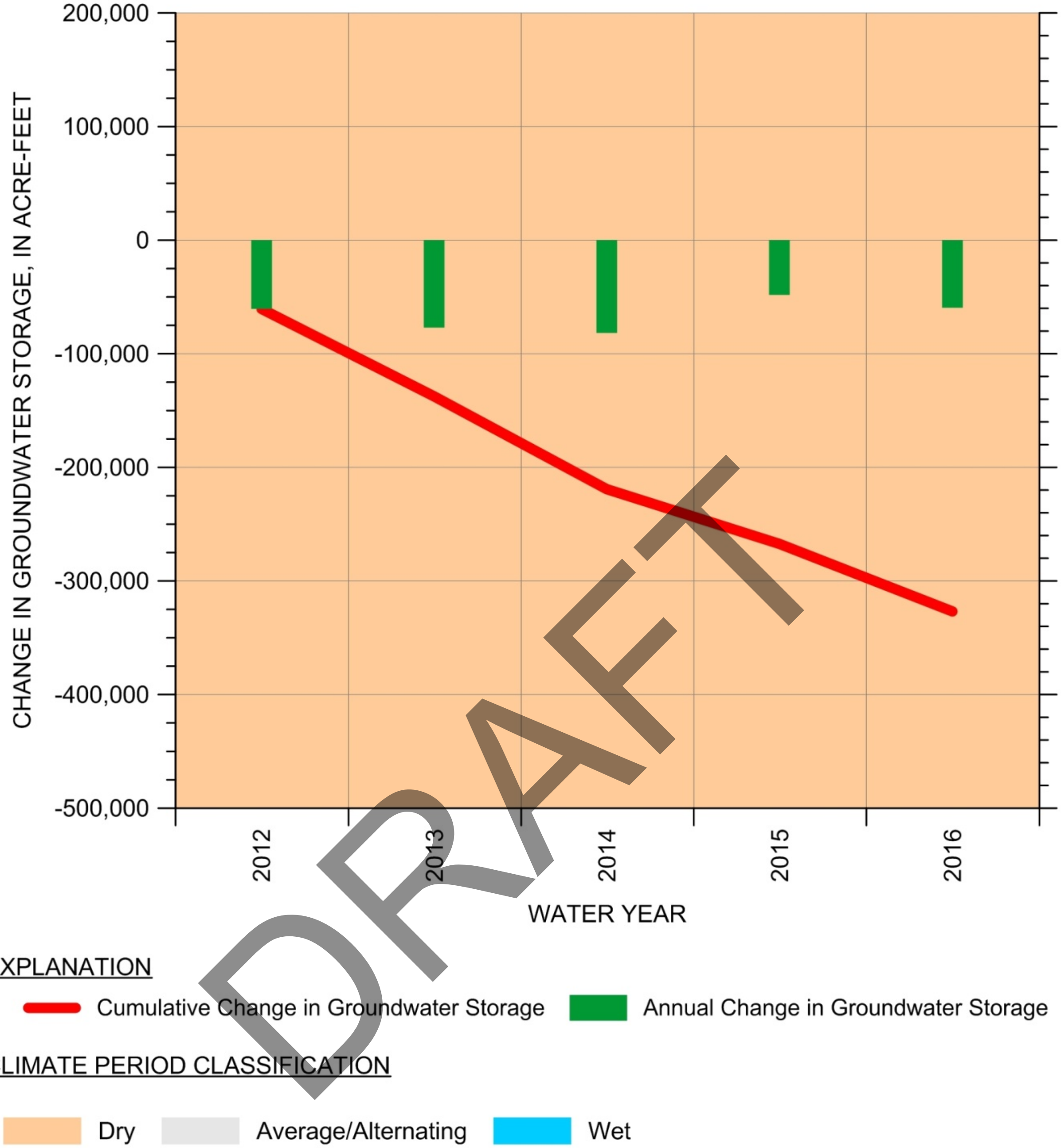

Figure 6-7. Current Annual (2012-2016) and Cumulative Change in Groundwater Storage

The current groundwater budget is strongly influenced by the drought; total groundwater pumping shows no trend over the five years that might be related to any continuing land use change. During the current water budget period, the amounts of recharge and streamflow percolation were very low and the average amount of pumping was slightly greater than the historical water budget period. Over the five-year current water budget period, a net loss of groundwater in storage of about 327,000 AF occurred (Figure 6-7). The annual average groundwater storage loss, or the difference between outflow and inflow to the basin, was approximately 65,400 AF.

6.4.2.4 Current Sustainable Yield

The substantial short-term depletion of groundwater from storage during the current water budget period indicates that total groundwater pumping from all water use sectors exceeded the total amount of recharge in the Subbasin. As summarized in Table 6-9, total groundwater pumping averaged approximately 85,800 AFY during the current period. The sustainable yield of the Subbasin can be estimated by subtracting the average groundwater storage deficit of 65,400 AFY from the total average amount of groundwater pumping. For the current water budget, the sustainable yield for the Subbasin is about 20,400 AFY. Due to the drought conditions, the estimated groundwater storage loss and low sustainable yield for the current water budget period are not appropriate for long-term sustainability planning.

6.5 Future Water Budget

SGMA Regulations require the development of a future surface water and groundwater budget to estimate future baseline conditions of supply, demand, and aquifer response to GSP implementation. The future water budget developed for this plan provides a baseline against which management actions will be evaluated over the GSP implementation period from 2020 to 2040. Future water budgets were developed using the updated basin-wide modeling platform.

In accordance with Section 354.18 (c)(3)(A) of the SGMA Regulations, the future water budget should be based on 50 years of historical precipitation, evapotranspiration, and streamflow information. The GSP model includes only 31 years of historical precipitation, evapotranspiration, and streamflow data. Therefore, the future water budget is based on 31 years of historical data rather than 50 years of historical data. It is believed that this time period is representative and is the best available information and approach for groundwater sustainability planning purposes.

6.5.1 Assumptions Used in Future Water Budget Development

Assumptions about future groundwater supplies and demands are described in the following subsections. An overarching assumption for the GSP is that any future increases in groundwater use within the Subbasin will be offset by equal reductions in groundwater use in other parts of the Subbasin, or in other words, groundwater neutral.

Future water budgets were developed using the GSP model. During the update process for the GSP model, all model components (e.g., groundwater pumping) of the entire original 2016 GSSI model area were updated, including components with Monterey County and the Atascadero Subbasin. However, information provided for the future water budget only pertains to the GSP Subbasin (Figure 1-1), thus do not include areas within Monterey County or the Atascadero Subbasin.

6.5.1.1 Future Non-Agricultural Water Demand Assumptions

Future non-agricultural water demands were estimated for the City of Paso Robles (City) and San Miguel Community Services District (SMCSD) based on the following available planning documents:

- Paso Robles 2015 Urban Water Management Plan (UWMP) (Todd Groundwater, 2016)
- San Miguel Community Services District Water & Wastewater Master Plan Update (Monsoon Consultants, 2017)

Projections of the City's groundwater demand were obtained from the City's UWMP. A portion of the City's future groundwater demand will be offset by imported Nacimiento water. The projected water demand for SMCSD was assumed to be satisfied solely by groundwater. Non-agricultural water demand for entities other than those listed above, such as residential wells and smaller commercial water users, was assumed to remain constant at 2016 rates. This assumption was made to be consistent with the overarching assumption that future growth will be groundwater neutral.

Total non-agricultural groundwater demand in the Subbasin is projected to increase from about 8,500 AFY in 2020 to about 8,700 AFY in 2040.

6.5.1.2 Future Wastewater Discharge Assumptions

Discharge of treated wastewater to the Salinas River provides a source of recharge to the Alluvial Aquifer. Rates of future wastewater discharge were estimated as a percentage of total water demand. Wastewater discharge as a percentage of water demand was calculated separately for each water provider. Projected annual wastewater discharge for San Miguel CSD is about 200 AFY, and projected annual wastewater discharge for the City of Paso Robles increases from about 2,900 AFY in 2020 to about 3,600 AFY by 2040.

6.5.1.3 Future Crop Acreage and Irrigation Efficiency Assumptions

In accordance with Section 354.18 (c)(3)(B) of the SGMA Regulations, the most recently available land use (in this case, crop acreage) and crop coefficient information should be used as the baseline condition for estimating future water demand. In this case, the 2016 crop acreage data obtained from the office of the San Luis Obispo County Agricultural Commissioner were used. These crop acreage data were the most recently available for the GSP. To account for irrigation efficiency in the future water budget, the reported crop coefficient information from GSSI (GSSI, 2016) was used.

In October 2015, the San Luis Obispo County Board of Supervisors adopted Resolution 2015-288, which established the Countywide Water Conservation Program (CWWCP) in response to the declining groundwater levels in County groundwater basins, including the Paso Robles Groundwater Subbasin. A key strategy of the CWWCP was to ensure all new construction and new or expanded agriculture offset its predicted water use by reducing existing water use on other properties within the same groundwater basin. The CWWCP will sunset with the adoption of GSP, however, conservation provisions in the GSP are expected to be similar to the existing program. This expectation supports the approach of using 2016 crop acreage and irrigation efficiencies for the future water budget.

6.5.1.4 Future Climate Assumptions

The SGMA Regulations require incorporating future climate estimates into the future water budget. To facilitate this climate evaluation, DWR developed an approach for incorporating reasonably expected, spatially gridded changes to monthly precipitation and reference evapotranspiration (ETo) into the updated model (DWR, 2018). The changes are presented as separate monthly change factors for both precipitation and ETo, and are intended to be applied to historical time series within the climatological base period through 2011. Specifically, precipitation and ETo change factors were applied to historical climate data for the period 1981 to 2011 for modeling the future water budget.

DWR provides several sets of change factors representing potential climate conditions in 2030 and 2070. DWR recommends using the 2030 change factors to evaluate conditions over the GSP implementation period (DWR, 2018). Consistent with DWR recommendations, datasets of monthly 2030 change factors for the Paso Robles area were applied to precipitation and ETo data from the historical base period to develop monthly time series of precipitation and ETo, which were then used to simulate future hydrology conditions.

6.5.2 Modifications to Modeling Platform to Simulate Future Conditions

The existing modeling platform was modified to simulate future conditions, and the results of these simulations are used to develop the future water budget.

6.5.2.1 Modification to Soil Water Balance Model

The soil water balance model operates on a daily time scale and tracks daily variations in soil water storage for different agricultural areas in the Paso Robles Subbasin. For consistency with the monthly climate change factors provided by DWR, the daily model was used to develop monthly soil water balance calculations. These calculations compute irrigation demand as the residual crop evapotranspiration demand unsatisfied by effective precipitation.

These calculations use monthly precipitation and ETo, rescaled by the monthly climate change factors provided by DWR, and the same monthly crop coefficients used in the historical water budget analysis. Empirical relationships were developed to account for soil moisture carryover from the winter into the spring based on results from the daily soil water balance model.

Monthly applied irrigation water was determined over the future base period from computed monthly crop demand and the crop-specific irrigation efficiencies. Agricultural irrigation return flow is then computed as the difference between the applied irrigation water and the crop demand. Results were then averaged to provide average monthly rates of applied irrigation water and irrigation return flow that would be expected under future climate conditions.

6.5.2.2 Modifications to the Watershed Model

The watershed model operates on a daily time scale and simulates streamflow and infiltration of direct precipitation. The watershed model was modified to account for climate change by rescaling daily precipitation and ETo with the monthly climate change factors provided by DWR. The watershed model was then re-run using the modified precipitation and ETo values.

Results from the modified historical base period simulation were then averaged to provide average monthly rates of infiltration of direct precipitation and streamflow under future climate conditions.

6.5.2.3 Modifications to the Groundwater Model

The groundwater model operates at a semi-annual time scale, with stress periods representing six-month periods. The groundwater model was extended and modified to simulate the period 2020 to 2040. Starting groundwater levels for the future simulation were set to groundwater levels at the end of Water Year (WY) 2016, extracted from the updated groundwater model.

Future groundwater recharge components were computed using the modified soil water balance model and watershed model, as described above. Future streamflow generated both inside and outside the Subbasin was computed using the modified watershed model.

Future agricultural groundwater pumping was computed based on the modified soil water balance model. Future non-agricultural groundwater pumping was determined based on water demand assumptions described in Section 6.4.1.1.

Future groundwater recharge, streamflow, and agricultural pumping are specified in the groundwater model as repeating average time-series, based on average monthly calculation of applied irrigation water, excess irrigation water, recharge of direct precipitation, and streamflow. This approach was adopted to simplify the future water budget and allow reporting of average future conditions accounting for climate change. Future non-agricultural pumping and wastewater return flows are the only inputs to the groundwater model that exhibit a long-term trend over the implementation period.

6.5.3 Projected Future Water Budget

Future surface water and groundwater budgets were projected.

6.5.3.1 Future Surface Water Budget

The future surface water budget includes average inflows from local imported supplies, average inflows from local supplies, average stream outflows, and average stream percolation to groundwater. Average future local imported supplies are estimated to be approximately 1,400 AFY. Table 6-11 summarizes the average local supply components of projected surface water budget.

Table 6-11. Projected Future Annual Average Surface Water Budget

Surface Water Budget Component	Flow Amount
Inflows	
Nacimiento River Inflow to Subbasin	214,300
Precipitation Runoff within Watershed	84,800
Salinas River Inflow to Subbasin	39,300
Groundwater Discharge to Rivers and Streams	4,600
Total	343,000
Outflows	
Nacimiento River Outflow from Subbasin	214,300
Salinas River Outflow from Subbasin	99,900
Percolation of Surface Water to Groundwater	28,800
Total	343,000

Note: All values in AF

6.5.3.2 Future Groundwater Budget

Projected groundwater budget components are computed using the modified groundwater flow model to simulate average conditions over the implementation period.

Table 6-12 summarizes projected annual groundwater inflows. In contrast to the historical groundwater budget which accounted for month-to-month variability, the projected groundwater budget is based on average monthly inflows. Therefore, variability in simulated groundwater budget components is minor, and minimum and maximum values are not included in Table 6-12.

Table 6-12. Projected Future Annual Groundwater Inflow to Subbasin

Groundwater Inflow Component	Average
Streamflow Percolation	28,800
Agricultural Irrigation Return Flow	14,500
Deep Percolation of Direct Precipitation	12,600
Subsurface Inflow into Subbasin	8,300
Wastewater Pond Leakage	3,500
Urban Irrigation Return Flow	1,800
Total	69,500

Note: All values in acre-feet (AF)

The total average annual groundwater inflow is 1,900 AF less during the future period than during the historical base period. Annual agricultural irrigation return flow is the inflow component with the most significant reduction – about 3,300 AF – between the historical base period and future water budget period. Reduction in agricultural irrigation return flow is due partly to changes in historical cropping patterns and partly to improvements in vineyard irrigation efficiency.

Table 6-13 summarizes projected annual groundwater outflows.

Table 6-13. Projected Future Annual Groundwater Outflow from Subbasin

Groundwater Outflow Component	Average
Total Groundwater Pumping	74,800
Discharge to Streams and Rivers from Alluvial Aquifer	4,600
Groundwater Flow Out of Subbasin	2,100
Riparian Evapotranspiration	1,700
Total	83,200

Note: All values in acre-feet (AF)

The total average annual groundwater outflow is estimated to be 800 AF less during the future period than during the historical base period. Future total annual groundwater pumping is projected to increase by about 2,400 AF compared to the historical base period. Concurrently, total annual discharge to streams and rivers and total annual groundwater outflow from the Subbasin are projected to decrease by about 2,700 AF and 500 AF, respectively.

6.5.3.3 Future Sustainable Yield

The projected future groundwater budget shows a long-term imbalance between inflows and outflows, with projected groundwater inflows of about 69,500 AFY and projected groundwater outflows of about 83,200 AFY. The projected future imbalance indicates an average annual decrease in groundwater in storage deficit of 13,700 AFY. The projected future sustainable yield of the Subbasin was estimated by subtracting the average groundwater storage deficit of 13,700 AFY from the total projected future average amount of groundwater pumping of 74,800 AFY. In this case, the future sustainable yield for the Subbasin period is estimated to be approximately 61,100 AFY. The estimated future sustainable yield is similar to the estimated sustainable yield for the historic base period. This similarity indicates that potential future changes in climate are not projected to have a substantial impact on the amount of groundwater that can be sustainably used compared to historical conditions.

DRAFT

Paso Robles Subbasin
Groundwater Sustainability Plan
Chapter 7 Monitoring Network

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

February 27, 2019

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7 MONITORING NETWORKS

This chapter describes the monitoring networks that exist and improvements to the monitoring networks that will be developed in the Subbasin as part of GSP implementation. This chapter is prepared in accordance with the SGMA regulations §354.32 and includes monitoring objectives, monitoring protocols, and data reporting requirements.

The monitoring networks presented in this chapter are based on existing monitoring sites. It will be necessary to expand the existing monitoring networks and identify or install more monitoring sites to fully demonstrate sustainability, refine the hydrogeologic conceptual model, and improve the GSP model. Monitoring networks are described for each of the five applicable sustainability indicators, and data gaps are identified for every monitoring network. These data gaps will be addressed during GSP implementation, as further described in Chapter 10: Plan Implementation. Addressing these data gaps and developing more extensive and complete monitoring networks will improve the GSA's ability to track progress and demonstrate sustainability. Data gaps will be addressed by the GSAs early during the GSP implementation, working together to sustainably protect the groundwater resource upon which they and their constituents rely.

7.1 Monitoring Objectives

The SGMA regulations require monitoring networks be developed to promote the collection of data of sufficient quality, frequency, and spatial distribution to characterize groundwater and related surface water conditions in the Subbasin and to evaluate changing conditions that occur through implementation of the GSP. The monitoring network should accomplish the following:

- Demonstrate progress toward achieving measurable objectives described in the GSP.
- Monitor impacts to the beneficial uses and users of groundwater.
- Monitor changes in groundwater conditions relative to measurable objectives and minimum thresholds.
- Quantify annual changes in water budget components.

The minimum thresholds and measurable objectives monitored by the networks are described in Chapter 8, Sustainable Management Criteria.

7.1.1 Monitoring Networks

Monitoring networks are developed for each of the five sustainability indicators that are relevant to the Subbasin:

- Chronic lowering of groundwater levels
- Reduction in groundwater storage
- Degraded water quality
- Land subsidence
- Depletion of interconnected surface water

The Subbasin is isolated from the Pacific Ocean and is not threatened by seawater intrusion; therefore, this GSP does not provide monitoring for the seawater intrusion sustainability indicator.

The SGMA regulations allow the GSP to use existing monitoring sites for the monitoring network. Wells used for monitoring, however, are limited by restrictions in §352.4(c) of the SMA regulations which requires the GSAs to provide various data for any wells used as monitoring wells, including but not limited to: CASGEM well identification number, well location, ground surface elevation, well depth, and perforated intervals. Wells for which these data were not available, or could not be easily inferred, could not be used in the current groundwater monitoring network.

The approach for establishing the monitoring network for this Subbasin is to leverage existing monitoring programs and incorporate additional monitoring locations that have been made available by cooperating entities. The monitoring networks are limited to locations with data that are publicly available and not collected under confidentiality agreements; the availability of well data and restrictions of existing confidentiality agreements results in a monitoring network with relatively few wells. This chapter identifies data gaps in each monitoring network and proposes locations for filling those data gaps.

7.1.2 Management Areas

The SGMA regulations require that if management areas are established, the quantity and density of monitoring sites in those areas shall be sufficient to evaluate conditions of the Subbasin setting and sustainable management criteria specific to that area. At this time, management areas have not been defined for the Subbasin. If management areas are developed in the future, the monitoring networks will be reevaluated to ensure that there is sufficient monitoring to evaluate conditions in each management area.

7.2 Groundwater Level Monitoring Network

The minimum thresholds and measurable objectives for the chronic lowering of groundwater levels sustainability indicator are evaluated by monitoring groundwater levels. The SGMA regulations require a network of monitoring wells sufficient to demonstrate groundwater occurrence, flow directions, and hydraulic gradients between principal aquifers and surface water features.

Existing well records and existing groundwater monitoring programs in the Subbasin are described in Chapters 3 and 5, respectively. Groundwater well construction data and water level data were obtained from the following public sources:

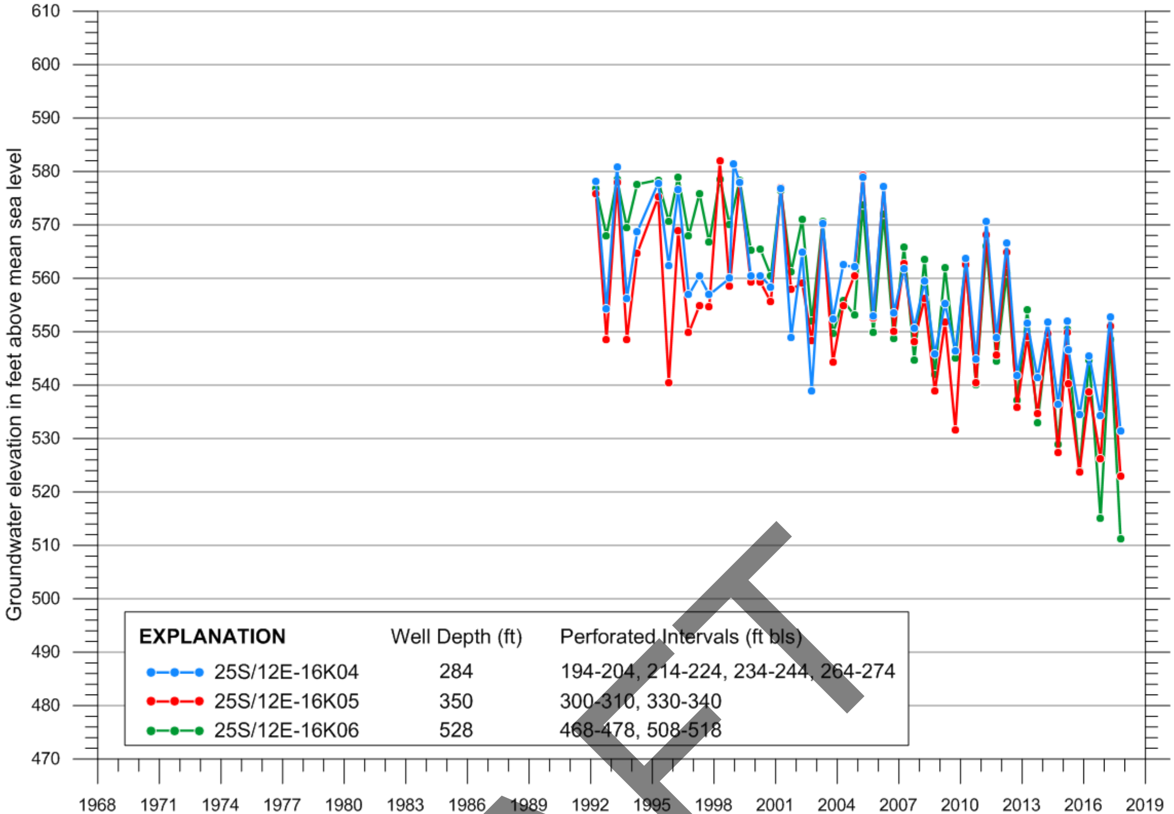
- San Luis Obispo County Flood Control and Water Conservation District (SLOFCWCD)
- USGS National Water Information System (NWIS)
- DWR Online System for Well Completion Reports (OSWCR)
- DWR SGMA Data Viewer
- DWR California Statewide Groundwater Elevation Monitoring (CASGEM)
- City of Paso Robles and San Miguel CSD for public drinking water supply wells

These data sources resulted in a dataset of thousands of wells. The dataset was analyzed using the following steps to assess whether individual wells could be included in the initial GSP groundwater level monitoring network:

- **Include Only Currently Measured Wells**. To reduce the possibility of selecting a well that has not been monitored in many years or that may no longer be accessible, wells were excluded that did not have at least one groundwater level measurement from 2012 or later. All the groundwater level monitoring data available for the Subbasin that met this criterion were provided by SLOFCWCD or the USGS NWIS, which have monitored groundwater levels in approximately 130 wells since 2012.

- **Remove Confidential Wells**. Most of the wells in the SLOFCWCD groundwater level monitoring network are subject to confidentiality agreements. Because monitoring data collected as part of this GSP will be publicly available, data from these confidential wells cannot be used and therefore these wells are currently excluded from the GSP monitoring network.

Applying these criteria resulted in 17 potential groundwater level monitoring wells in the Subbasin that could be used to monitor future groundwater levels as part of GSP implementation. Within this group of 17 wells, there are two well clusters: each consisting of three wells in the same location. The wells in these two clusters are all screened in the Paso Robles Formation Aquifer at various depths. A comparison of hydrographs for each cluster indicates that water levels have been generally similar in the three wells in each cluster, as shown on Figure 7-1. Only one well was selected from each cluster for inclusion in the monitoring network because it is representative of all the wells in that cluster. The two wells selected for monitoring are wells 26S/15E-20B04 and 25S/12E-16K05, which narrows the list of potential monitoring wells to 13 after removing the other wells in each cluster.



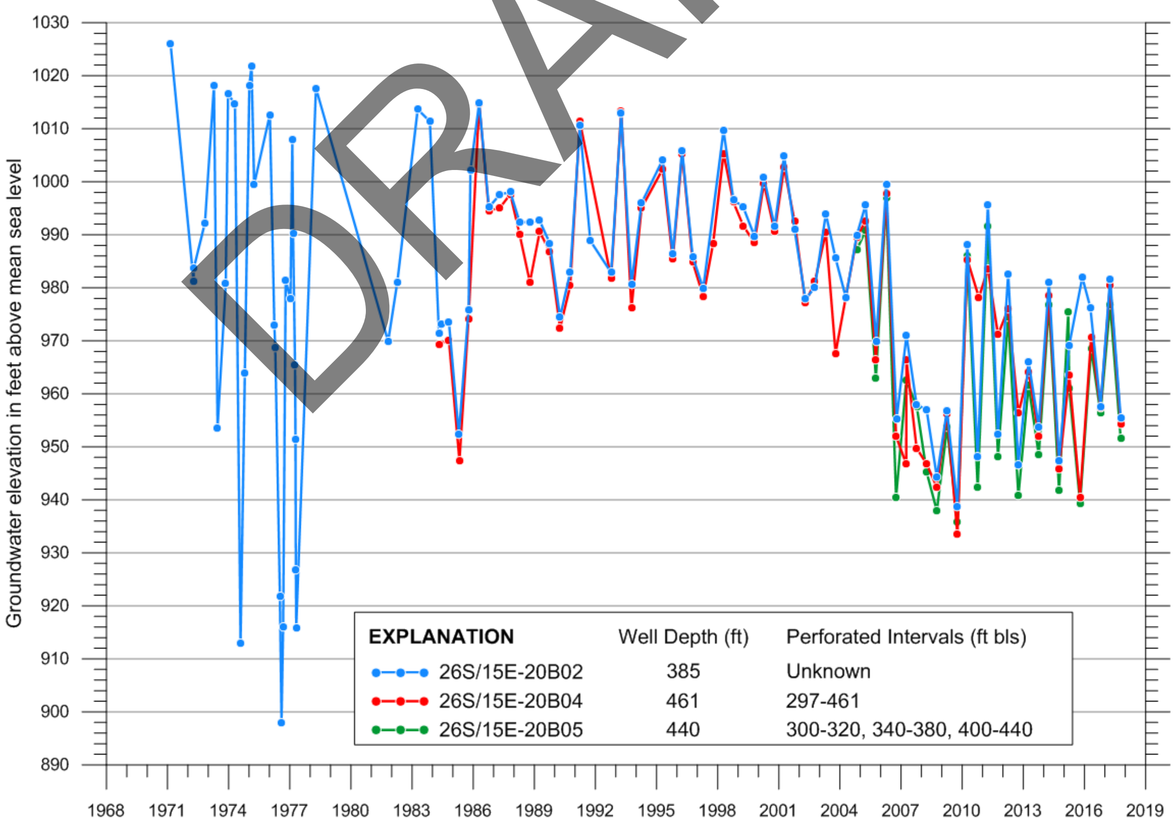


Figure 7-1. Hydrographs of Wells in Well Clusters

There are two principal aquifers in the Subbasin, as described in Chapter 4. The Alluvial Aquifer occurs along stream channels and is generally up to about 100 feet thick. The Paso Robles Formation Aquifer occurs in thin discontinuous sand and gravel zones throughout the Subbasin. The wells in the proposed monitoring network are assigned to an aquifer according to these guidelines:

- The well location is compared to the surface geology map, Figure 4-4.
- If the well is located where the Paso Robles Formation is mapped at land surface on the surface geology map, then it is assumed to be monitoring the Paso Robles Formation Aquifer.
- If the well is located in the mapped extent of alluvium, and the screened interval or total well depth is less than 100 feet, then it was assumed to be monitoring the Alluvial Aquifer. If the top of the perforated interval is greater than 100 feet below land surface, then the well was assumed to be monitoring the Paso Robles Formation Aquifer.

The depths of 2 of the 13 wells are unknown: 27S-14E-29G01 and 25S/12E-20K03. Although well completion reports are available online via the State's OSWCR system, the well completion report numbers are unknown for these wells and therefore it is impossible to identify the associated well completion reports. For well 27S-14E-29G01, depth to water is greater than 150 feet below land surface on average and therefore was assumed to be monitoring the Paso Robles Formation Aquifer and was included in the monitoring network. Depth to water in well 25S/12E-20K03 is approximately 30 feet below land surface and may be monitoring the alluvial aquifer, but its aquifer designation is unknown pending confirmation of screened interval and/or total depth. Therefore, this well was excluded from the monitoring network at this time. This well will be included in the monitoring network after the well completion information is verified during GSP implementation.

Based on these guidelines, there are currently 12 wells in the network monitoring groundwater levels the Paso Robles Formation Aquifer. Representative monitoring wells for the Alluvial Aquifer that meet the criteria of known well depth and publicly available data have not been identified. However, there are numerous wells that are believed to exist within the Alluvial Aquifer that could be included in the monitoring network after the data on depth and screened interval are obtained and confidentiality restrictions are lifted. Some of these wells will be assessed in the future during GSP implementation to obtain well depth and/or screened interval, as described in Chapter 10. The wells in the water level monitoring network are listed in Table 7-1 and shown on Figure 7-2.

All 12 wells are part of the SLOFCWCD monitoring network. These wells either are not subject to confidentiality agreements or the well data are located in a public database hosted by DWR and therefore are publicly available from at least one source. The monitoring frequency indicates that water levels are presumably measured twice a year, in accordance with the SLOFCWCD protocol of measuring depths to water in April and October of each year. The most recent available measurement was 2016 or 2017 in all wells.

Table 7-1. Groundwater Level Monitoring Well Network in Paso Robles Formation Aquifer

Well ID (alt ID)	Well Depth (feet)	Screen Interval(s) (feet bls)	Reference Point Elevation (feet AMSL)	First Year of Data	Last Year of Data	Years Measured (years)	Number of Measurements
25S/12E-16K05 (PASO-0345)	350	300-310, 330-340	669.8	1992	2017	25	52
25S/12E-26L01 (PASO-0205)	400	200-400	719.72	1970	2017	47	103
25S/13E-08L02 (PASO-0195)	270	110-270	1033.81	2012	2017	5	11
26S/12E-26E07 (PASO-0124)	400	---	835	1958	2017	59	128
26S/13E-08M01 (PASO-0164)	400	260-400	827.92	2013	2017	4	11
26S/13E-16N01 (PASO-0282)	400	200-400	890.17	2012	2017	5	11
26S/15E-20B04 (PASO-0401)	461	297-461	1036.36	1984	2017	33	66
27S/12E-13N01 (PASO-0223)	295	195-295	972.42	2012	2017	5	11
27S/13E-28F01 (PASO-0243)	212	118-212	1072	1969	2017	48	104
27S/13E-30N01 (PASO-0086)	355	215-235, 275-355	1086.73	2012	2016	4	6
27S/14E-29G01 (PASO-0041)	---	---	1201.5	1974	2017	43	73
28S/13E-01B01 (PASO-0066)	254	154-254	1099.93	2012	2016	4	9

Notes

--- = unknown

ASML – above mean sea level

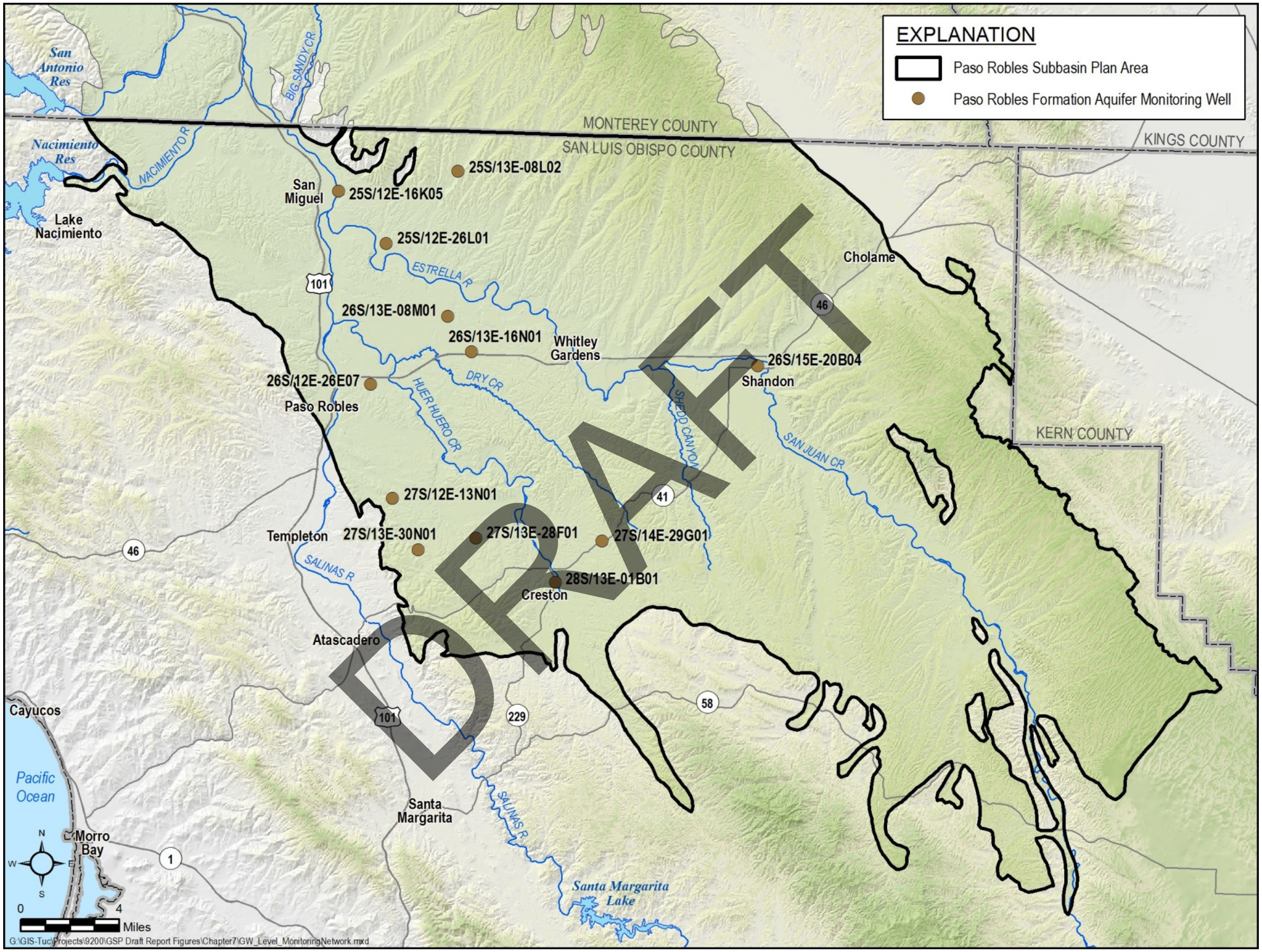


Figure 7-2. Groundwater Level Monitoring Well Network in Paso Robles Formation Aquifer

7.2.1 Groundwater Level Monitoring Network Data Gaps

Data gaps have been identified using guidelines in the SGMA regulations and BMPs published by DWR on monitoring networks (DWR, 2016a). Table 7-2 summarizes the suggested attributes of a groundwater level monitoring network from the BMPs in comparison to the current network, and identifies data gaps.

The SGMA regulations require a sufficient density of monitoring wells to characterize the groundwater table or potentiometric surface for each principal aquifer. Professional judgement is also used to determine an adequate level of monitoring density in areas of active groundwater pumping and near specific projects that will be developed in the Subbasin under the GSP.

While there is no definitive rule on well density, the BMP cites a range of 0.2 to 10 wells per 100 square miles, with a median of 5 wells per 100 square miles from various cited studies. The CASGEM monitoring plan is 10 to 20 wells per 100 square miles (SLOFCWCD, 2014). The Subbasin is 684 square miles, which equates to 34 wells at a median density of 5 wells per 100 square miles. The monitoring network of 12 wells is within the recommended range cited in the BMP (1 to 68 wells), but the number of monitoring wells is considered low given the size and complexity of the Subbasin.

The BMP document states that groundwater level data must be collected from each principal aquifer in the Subbasin. The current monitoring network only includes wells assigned to the Paso Robles Formation Aquifer. There are no wells in the current monitoring network that monitor the Alluvial Aquifer. This is a data gap that will be addressed in the near future, possibly by video logging, as further described in Chapter 10, Plan Implementation.

A program to increase monitoring frequency will be developed to determine seasonal high and low groundwater elevations and also monitor groundwater response to recharge and other activities. One method to increase monitoring frequency is to install continuous dataloggers in existing and new monitoring wells, as further described in Chapter 10, Plan Implementation.

Groundwater level data must be sufficient to identify changes in groundwater flow directions and gradients. Groundwater contour maps are presented in Chapter 5 for both aquifers. These maps were prepared using available monitoring data, including data collected from wells subject to confidentiality agreements. To comply with the confidentiality agreements, the data and well locations are not included on the maps. During the implementation phase of the GSP, groundwater elevation maps will be developed using only the publicly available data collected as part of this GSP. The 12 wells in the proposed GSP monitoring network are insufficient to develop representative and sufficiently detailed groundwater contour maps for either the Paso Robles Formation or Alluvial Aquifers. The lack of publicly available data for both aquifers is identified as a data gap that will be addressed early in GSP implementation.

A recent study by GSI Water Solutions, Inc. (GSI) came to similar conclusions about data gaps in the Paso Robles Formation (GSI, 2018). The data gap areas developed by GSI are shown on Figure 7-3. These are areas where existing wells that can serve as monitoring wells should be identified, or new monitoring wells should be installed in the Paso Robles Formation Aquifer. Figure 7-3 also shows locations of data gaps and potential new well locations for the Alluvial Aquifer.

The data gap areas on Figure 7-3 will be addressed in the future by either identifying an existing well in the area that meets the criteria for a valid monitoring well, or drilling a new well in the area, as further described in Chapter 10, Plan Implementation. There are approximately 90 confidential wells in the Subbasin that have been monitored since 2012 that could be used to fill some of these data gaps if the well owners agree to sign amended confidentiality agreements. SLOFCWCD will attempt to secure such amended agreements in areas where data gaps have been identified. The GSI data gap report identifies and targets specific confidential wells for consideration as new monitoring wells in a publicly accessible monitoring system. If an existing well cannot be identified to fill a data gap, it will be necessary to drill a new monitoring well for that data gap area.

Table 7-2. Summary of Best Management Practices, Groundwater Level Monitoring Well Network, and Data Gaps

Best Management Practice (DWR, 2016a)	Current Monitoring Network	Data Gap
Groundwater level data will be collected from each principal aquifer in the basin.	12 wells in the Paso Robles Formation Aquifer; no wells in the Alluvial Aquifer	Additional wells are needed; well depth, screen interval, well log, and aquifer designation are unknown for candidate monitoring wells; renegotiate to release confidentiality from confidential wells with water level measurement more recent than 2000 in database
Groundwater level data must be sufficient to produce seasonal maps of groundwater elevations throughout the basin that clearly identify changes in groundwater flow direction and gradient (Spatial Density).	Confidential data from 43 wells and non-confidential data from 9 wells were used to create seasonal groundwater elevation maps for the Paso Robles Formation Aquifer (Chapter 5); Confidential data from 7 wells and data from 1 non-confidential well were used to create an annual groundwater elevation map for the Alluvial Aquifer (Chapter 5).	Some data used to prepare groundwater elevation maps in the GSP are confidential; in the future, only publicly available data will be used to develop contour maps. Additional wells are needed to develop representative contour maps.
Groundwater levels will be collected during the middle of October and March for comparative reporting purposes, although more frequent monitoring may be required (Frequency).	All 12 wells in the existing monitoring network have been monitored twice a year, in spring (April) and fall (October), since at least 2012.	Seasonal monitoring is the protocol for SLOFCWCD (Appendix E); more frequent monitoring may be needed to identify actual seasonal high and low groundwater elevations and further characterize groundwater level fluctuations; instrumentation like transducers or other technology may be used in future to monitor groundwater elevations.
Data must be sufficient for mapping groundwater depressions, recharge areas, and along margins of basins where groundwater flow is known to enter or leave a basin.	Current network of 12 wells is insufficient for mapping all of these areas.	Additional monitoring wells are required in groundwater depressions, near recharge features such as rivers and streams, and along Subbasin margins; possibly install instrumentation like transducers or other technology in future monitoring wells.
Well density must be adequate to determine changes in storage.	Current network of 12 wells is insufficient for determining changes in groundwater storage.	Additional monitoring wells are required to adequately cover the Subbasin and determine changes in groundwater storage.
Data must be able to demonstrate the interconnectivity between shallow groundwater and surface water bodies, where appropriate.	There is at least one well that may be completed in the Alluvial Aquifer if construction data were known.	Additional wells will be needed in the Alluvial Aquifer near reaches of interconnected surface water to characterize interconnectivity.
Data must be able to map the effects of management actions, i.e., managed aquifer recharge.	Current network of 12 wells is inadequate for mapping the effects of management actions.	Additional monitoring wells are required to map the effectiveness of management actions. This monitoring will be addressed as projects are implemented
Data must be able to demonstrate conditions near basin boundaries; agencies may consider coordinating monitoring efforts with adjacent basins to provide consistent data across basin boundaries. Agencies may consider characterization and continued impacts of internal hydraulic boundary conditions, such as faults, disconformities, or other internal boundary types.	Several wells in the existing monitoring network are used to monitor conditions on the southwestern boundary of the Subbasin.	Additional wells are likely necessary along the northern boundary with the Upper Valley Subbasin of the Salinas Valley. Additional wells may be necessary to map the structure and effect of internal faults.
Data must be able to characterize conditions and monitor adverse impacts to beneficial uses and users identified within the basin.	The current monitoring network characterizes only a portion of the Subbasin and the potential impacts.	Network will be expanded in accordance with the data gaps identified above.

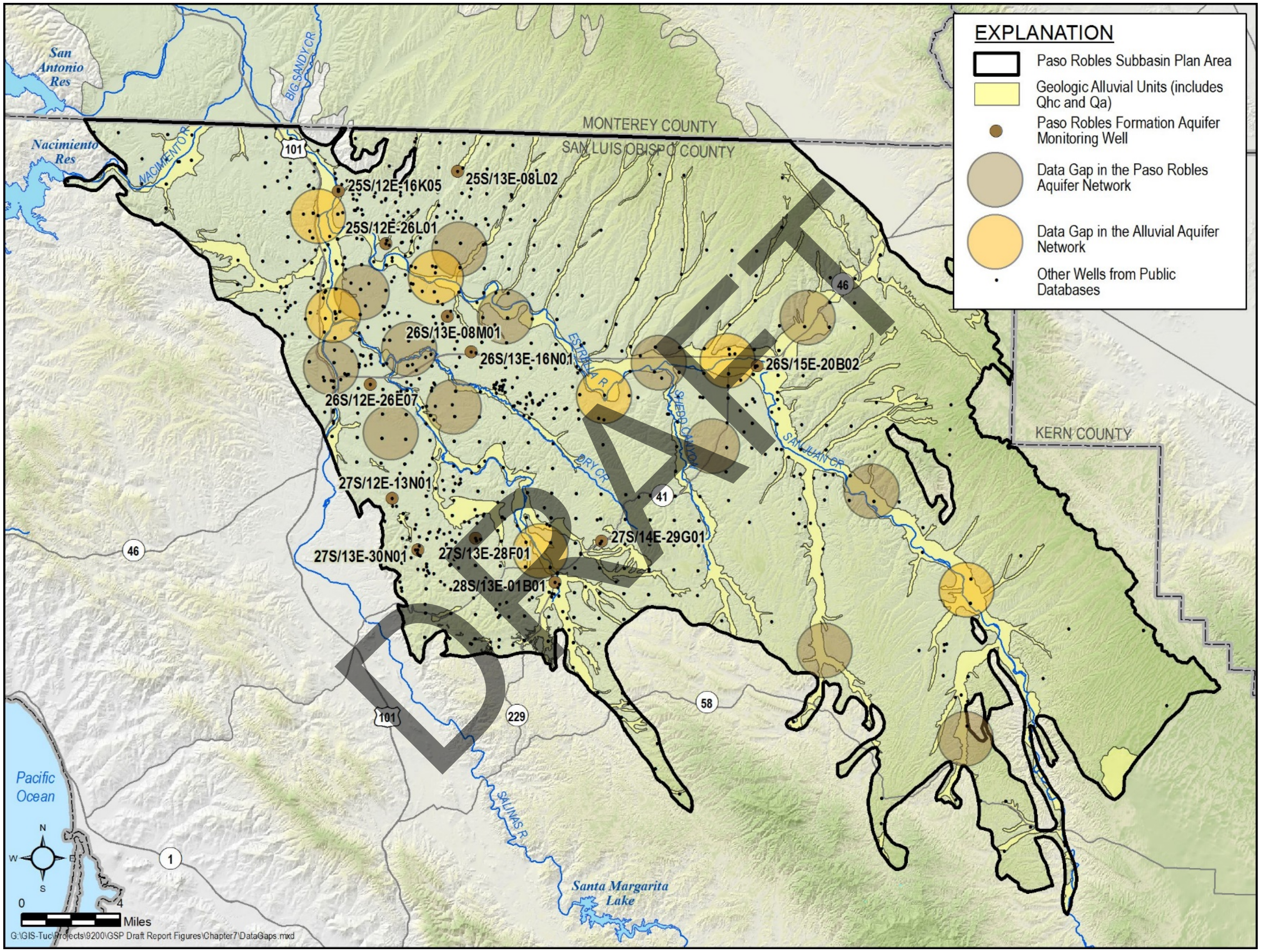


Figure 7-3. Data Gaps in the Groundwater Level Monitoring Well Network

7.2.2 Groundwater Level Monitoring Protocols

The groundwater level monitoring protocols established by SLOFCWCD are adopted by this GSP for manual groundwater level monitoring. The monitoring protocols are included in Appendix E.

There are various automated groundwater level monitoring devices in operation across the Subbasin and the GSP implementation phase will incorporate automated logging of groundwater elevations. Automated water level monitoring is already used in a number of private wells in the basin; these data may be used to supplement the current water level monitoring network in the future. As automated groundwater level monitoring systems are added to the monitoring network, appropriate protocols for each automated system will be incorporated into this GSP.

Automated groundwater level monitoring systems have the advantage of supplying more frequent groundwater levels with no increase in monitoring costs. The groundwater level monitoring BMP recommends more frequent monitoring in certain areas, including shallow, unconfined aquifers, in areas of rapid recharge, in areas of greater withdrawal rates, and in areas of more variable climatic conditions. More frequent monitoring may also be required in specific places where sustainability indicators are a concern or to track impacts of specific management actions and projects. The need for more frequent monitoring will be evaluated, and a program to increase monitoring frequency will be developed during the GSP implementation phase, described in Chapter 10.

7.3 Groundwater Storage Monitoring Network

This GSP adopts groundwater levels as a proxy for assessing change in groundwater storage, as described in Chapter 8, Sustainable Management Criteria. Groundwater level monitoring points that are adequate for collecting the groundwater level data are identified in Section 7.2. Therefore, the network of wells providing groundwater level data for the reduction in groundwater storage sustainability indicator is the same wells shown on Table 7-1.

7.3.1 Groundwater Storage Monitoring Data Gaps

Data gaps in the groundwater storage monitoring network are similar to the data gaps identified for the groundwater level monitoring network discussed in Section 7.2.1. Because change in groundwater storage is predominantly influenced by changes in shallow water table elevations, more shallow wells than those discussed in Section 7.2.1 may be necessary. Additional water table wells may be needed throughout the Paso Robles Formation Aquifer. The number of additional water table wells will not be known until there is an assessment of how many existing wells are screened at or near the existing water table in the Paso Robles

Formation Aquifer. This is a data gap that will be addressed during GSP implementation as described in Chapter 10: Plan Implementation.

7.3.2 Groundwater Storage Monitoring Protocols

The groundwater storage monitoring network is identical to the groundwater level monitoring network. Therefore, the protocols used for gathering water level data to assess changes in groundwater storage are identical to the protocols used for the chronic lowering of groundwater levels sustainability indicator. Protocols for the manual collection of groundwater levels are included in Appendix E. As automated groundwater level collection devices are added to the monitoring network, protocols will be developed for each of these automated systems and incorporated into the GSP.

7.4 Water Quality Monitoring Network

The sustainability indicator for degraded water quality is evaluated by monitoring groundwater quality at a network of existing supply wells. The SGMA regulations require sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators to address known water quality issues.

As described in Chapter 5, there are no known contaminant plumes in the Subbasin, therefore the monitoring network is monitoring only non-point source constituents of concern and naturally occurring water quality impacts.

Existing groundwater quality monitoring programs in the Subbasin are described in Chapter 3 and groundwater quality distribution and trends are described in Chapter 5. Constituents of concern were identified in Chapter 5 based on comparison to drinking water standards and levels that could impact crop production. As described in Chapter 8, separate minimum thresholds are set for agricultural constituents of concern and public supply well constituents of concern. Therefore, although there is a single groundwater quality monitoring network, different wells in the network will be assessed for different constituents. Constituents of concern for drinking water will be assessed at public water supply wells. Constituents of concern for crop health will be assessed at agricultural supply wells.

The public water supply wells included in the monitoring network were identified by reviewing data from the State Water Resources Control Board (SWRCB) Division of Drinking Water. Wells were selected that were sampled for at least one of the constituents of concern during 2015 or more recently. These wells are listed in Table 7-3 and shown on Figure 7-4. For the 41 public supply wells in the groundwater quality monitoring network, an assumed aquifer designation was assigned based on surficial geologic maps (Figure 4-4) and well depths when available. There are 31 wells that are in the Paso Robles Formation Aquifer, seven wells in the Alluvial Aquifer, and three wells where the aquifer could not be estimated.

Verifying the aquifer for these three wells is a data gap that will be addressed during plan implementation.

The agricultural supply wells included in the monitoring network were identified by reviewing data from the Irrigated Lands Regulatory Program (ILRP) that are stored in the SWRCB's Geotracker/GAMA database. Wells were selected that had detections of at least one of the agricultural constituents of concern reported from 2015 or more recently (GAMA, 2015). There are 28 ILRP properties with agricultural supply wells in the groundwater quality monitoring network. Since multiple wells of unknown depth are associated with a given IRLP ID, the aquifer monitored by these wells is unknown. These wells are listed in Table 7-3 and shown on Figure 7-4. If an IRLP property has multiple wells, the location of the well is shown at the average of these coordinates.

Table 7-3. Groundwater Quality Monitoring Well Network

Well ID	Type of Well	Well Depth[1] (feet)	Screen Interval (feet bls)	First Measurement Date	Last Measurement Date	Measurement Period (years)	Measurement Count	Assumed Aquifer
W0604000207-001	PWS	440	340-440	2002	2018	16	63	PR
W0604000210-001	PWS	117	87-117	2002	2015	13	9	---
W0604000512-001	PWS	60	30-60	2002	2015	13	13	AA
W0604000554-001	PWS	355	155-355	2002	2016	14	16	PR
W0604000554-003	PWS	237	174-237	2002	2016	14	16	PR
W0604000620-001	PWS	354	120-354	2001	2018	17	36	PR
W0604000620-002	PWS	510	310-510	2002	2018	16	41	PR
W0604000693-002	PWS	40	---	2005	2017	12	9	AA
W0604000708-001	PWS	80	80-80	2002	2018	16	10	AA
W0604000781-001	PWS	792	412-792	2002	2018	16	21	PR
W0604000781-011	PWS	670	380-670	2002	2018	16	21	PR
W0604000788-001	PWS	450	235-450	2002	2018	16	15	PR
W0604000788-005	PWS	920	400-920	2003	2018	15	14	PR
W0604000789-001	PWS	245	125-245	2002	2018	16	17	PR
W0604000790-001	PWS	175	126-175	2002	2018	16	62	---
W0604000803-001	PWS	420	100-420	2004	2018	14	10	PR
W0604000803-002	PWS	420	200-420	2004	2018	14	10	PR
W0604010007-003	PWS	400	200-400	1984	2016	32	36	PR
W0604010007-004	PWS	500	---	1984	2018	34	82	PR
W0604010007-006	PWS	344	---	1987	2018	31	34	PR
W0604010007-007	PWS	80	20-80	1984	2017	33	23	AA
W0604010007-008	PWS	80	20-80	1984	2018	34	24	AA

Well ID	Type of Well	Well Depth[1] (feet)	Screen Interval (feet bls)	First Measurement Date	Last Measurement Date	Measurement Period (years)	Measurement Count	Assumed Aquifer
W0604010007-009	PWS	---	---	1990	2018	28	8	---
W0604010007-010	PWS	600	260-600	1990	2017	27	17	PR
W0604010007-012	PWS	425	---	1984	2018	34	35	PR
W0604010007-013	PWS	317	---	1984	2018	34	34	PR
W0604010007-017	PWS	675	---	1993	2018	25	26	PR
W0604010007-018	PWS	535	---	1993	2016	23	23	PR
W0604010007-019	PWS	220	---	1995	2017	22	25	PR
W0604010007-020	PWS	610	---	1996	2017	21	22	PR
W0604010007-021	PWS	100	---	1998	2018	20	22	AA
W0604010007-038	PWS	1060	300-1060	2003	2018	15	18	PR
W0604010010-004	PWS	300	85-300	1984	2018	34	118	PR
W0604010010-005	PWS	360	162-360	1991	2018	27	105	PR
W0604010010-009	PWS	380	350-380	2007	2018	11	250	PR
W0604010028-002	PWS	342	297-342	1991	2018	27	46	PR
W0604010028-004	PWS	400	300-400	2002	2018	16	31	PR
W0604010831-001	PWS	840	640-840	1989	2016	27	24	PR
W0604010831-002	PWS	446	401-446	1989	2016	27	23	PR
W0604010831-003	PWS	475	410-475	1989	2016	27	24	PR
W0604010900-002	PWS	50	---	1999	2018	19	18	AA
AGL020000646	ILRP	660	---	2012	2017	5	---	---
AGL020000801	ILRP	---	---	2013	2017	4	---	---
AGL020001525	ILRP	---	---	2014	2017	3	---	---
AGL020001534	ILRP	---	---	2013	2017	4	---	---

Well ID	Type of Well	Well Depth[1] (feet)	Screen Interval (feet bls)	First Measurement Date	Last Measurement Date	Measurement Period (years)	Measurement Count	Assumed Aquifer
AGL020001605	ILRP	---	---	2015	2017	2	---	---
AGL020001689	ILRP	---	---	2014	2017	3	---	---
AGL020001800	ILRP	---	---	2015	2015	<1	---	---
AGL020003900	ILRP	---	---	2015	2015	<1	---	---
AGL020004014	ILRP	---	---	2014	2017	3	---	---
AGL020005173	ILRP	---	---	2015	2017	2	---	---
AGL020005268	ILRP	---	---	2015	2015	<1	---	---
AGL020007128	ILRP	---	---	2014	2017	3	---	---
AGL020007471	ILRP	---	---	2015	2015	<1	---	---
AGL020007593	ILRP	---	---	2015	2018	3	---	---
AGL020007721	ILRP	---	---	2017	2017	<1	---	---
AGL020007807	ILRP	---	---	2012	2017	5	---	---
AGL020007815	ILRP	---	---	2012	2017	5	---	---
AGL020007848	ILRP	---	---	2015	2015	<1	---	---
AGL020007872	ILRP	---	---	2015	2018	3	---	---
AGL020009803	ILRP	---	---	2014	2018	4	---	---
AGL020010282	ILRP	---	---	2012	2015	3	---	---
AGL020013814	ILRP	---	---	2015	2018	3	---	---
AGL020015242	ILRP	---	---	2015	2018	3	---	---
AGL020015302	ILRP	---	---	2013	2017	4	---	---
AGL020016382	ILRP	---	---	2015	2018	3	---	---
AGL020024742	ILRP	---	---	2016	2017	1	---	---
AGL020025402	ILRP	---	---	2015	2017	2	---	---

Well ID	Type of Well	Well Depth[1] (feet)	Screen Interval (feet bls)	First Measurement Date	Last Measurement Date	Measurement Period (years)	Measurement Count	Assumed Aquifer
AGL020028348	ILRP	---	---	2017	2017	<1	---	---

Notes

--- = Unknown

(1) = total well depth is assumed to be equivalent to bottom of perforated interval

AA = Alluvial Aquifer; PR = Paso Robles Formation Aquifer

PWS = Public water supply

ILRP = Irrigated Lands Regulatory Program

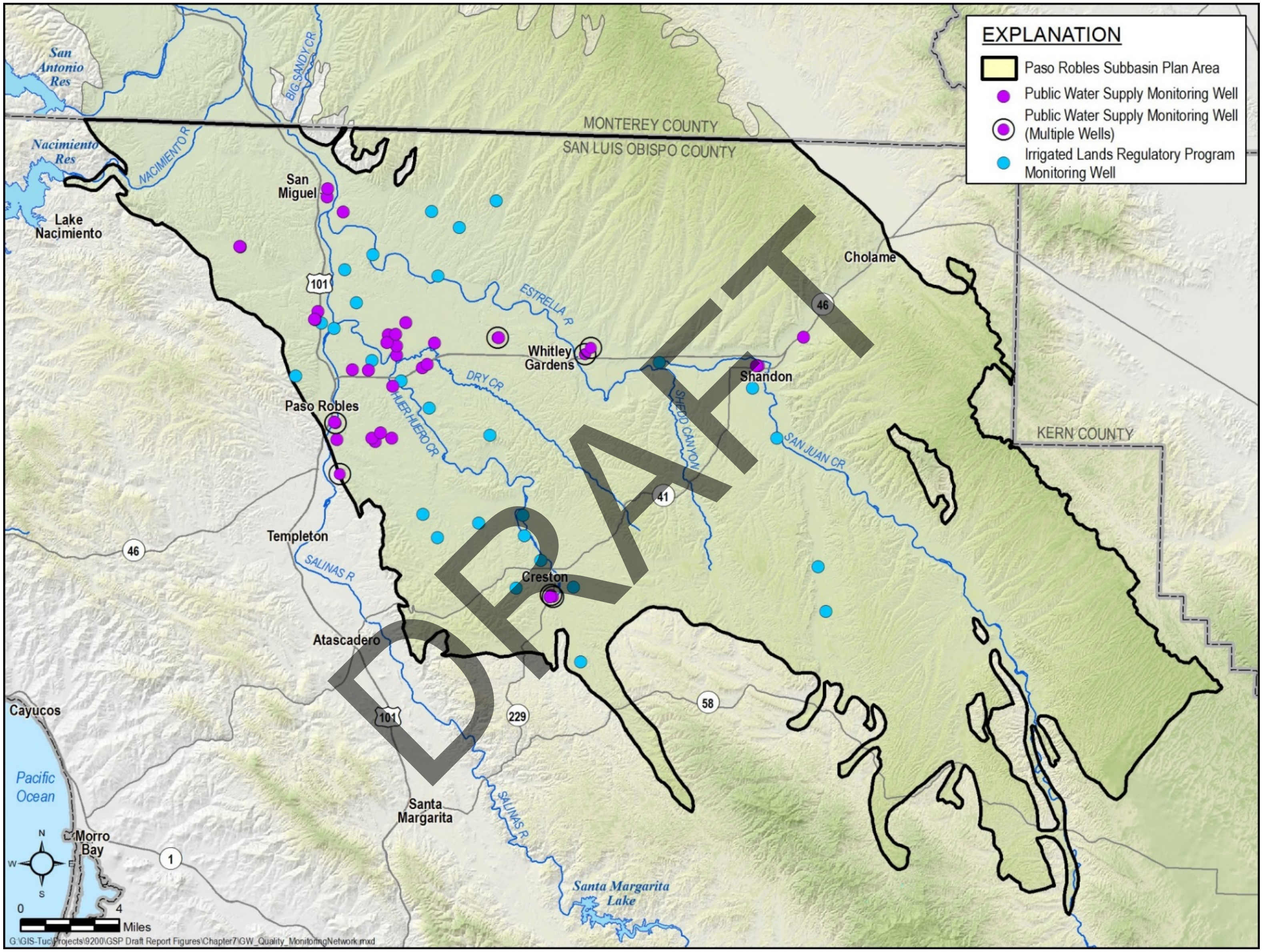


Figure 7-4. Groundwater Quality Monitoring Well Network

7.4.1 Groundwater Quality Monitoring Data Gaps

Data gaps have been identified based on the SGMA regulations and BMPs published by DWR on monitoring networks (DWR, 2016a). Table 7-4 summarizes the recommendations for groundwater quality monitoring from the BMPs, the current network, and data gaps. There is adequate spatial coverage in the network to assess impacts to beneficial uses and users. The primary data gap is that well construction info for many wells in the monitoring network is unknown. Additional wells may be necessary to monitor impacts of projects and actions on water quality. Addressing these data gaps is part of the GSP implementation phase, as described in Chapter 10.

7.4.2 Groundwater Quality Monitoring Protocols

Water quality samples are currently being collected according to SWRCB and ILRP requirements. ILRP data are currently collected under Central Coast RWQCB Ag Order 3.0. ILRP samples are collected under the Tier 1, Tier 2, or Tier 3 monitoring and reporting programs. Copies of these monitoring and reporting programs are included in Appendix E, and incorporated herein as monitoring protocols. These protocols will continue to be followed during GSP implementation for the groundwater quality monitoring.

7.5 Land Subsidence Monitoring Network

The sustainability indicator for land subsidence is evaluated by monitoring land surface elevation at a network of Continuous GPS (CGPS) sites and calculating an annual rate of change at each site. As described in Chapter 5, the existing land subsidence monitoring program in the Subbasin includes five CGPS stations that measure the three-dimensional position of a point on the earth's surface in time intervals as frequent as 15 seconds. Horizontal and vertical movement are monitored, but vertical movement is the primary interest and can be an indication of subsidence or uplift. DWR references a dataset managed by the University NAVSTAR Consortium (UNAVCO). The UNAVCO Data Center handles data management and processing for a global network of GPS instrumentation that record signals from the five CGPS stations. UNAVCO's Data Archive Interface (DAIv2) can be used to access and download the latest CGPS data from the available stations (UNAVCO, 2019).

The five CGPS stations in the network are shown on Figure 7-5 and summarized in Table 7-5. The subsidence data are shown in Figure 7-6.

Table 7-4. Summary of Groundwater Quality Monitoring, Best Management Practices, and Data Gaps

Best Management Practice (DWR, 2016a)	Current Network	Data Gap
Monitor groundwater quality data from each principal aquifer in the basin that is currently, or may be in the future, impacted by degraded water quality. • The spatial distribution must be adequate to map or supplement mapping of known contaminants. • Monitoring should occur based upon professional opinion, but generally correlate to the seasonal high and low groundwater level, or more frequent as appropriate.	There are 41 municipal wells and 28 IRLP wells within the plan area that have been regularly sampled since at least 2015 for groundwater quality.	None; the current monitoring network contains adequate spatial distribution to map water quality in the basin.
Collect groundwater quality data from each principal aquifer in the basin that is currently, or may be in the future, impacted by degraded water quality. • Agencies should use existing water quality monitoring data to the greatest degree possible. For example, these could include ILRP, GAMA, existing RWQCB monitoring and remediation programs, and drinking water source assessment programs.	Public databases provide adequate water quality information for degraded water quality.	Well depth and construction info for some wells in the monitoring network is unknown; however, there seems to be adequate coverage in both principal aquifers
Define the three-dimensional extent of any existing degraded water quality impact.	There are a large number of wells that are actively sampled.	Depth or construction information will need to be obtained to determine the vertical extent of contaminants
Data should be sufficient for mapping movement of degraded water quality.	There are a large number of wells that are actively sampled.	None
Data should be sufficient to assess groundwater quality impacts to beneficial uses and users.	Water quality monitoring program assesses impacts to both agricultural and municipal users.	None
Data should be adequate to evaluate whether management activities are contributing to water quality degradation.	There are a large number of wells that are actively sampled.	Projects and actions are being developed. Water quality network will be evaluated and augmented if necessary.

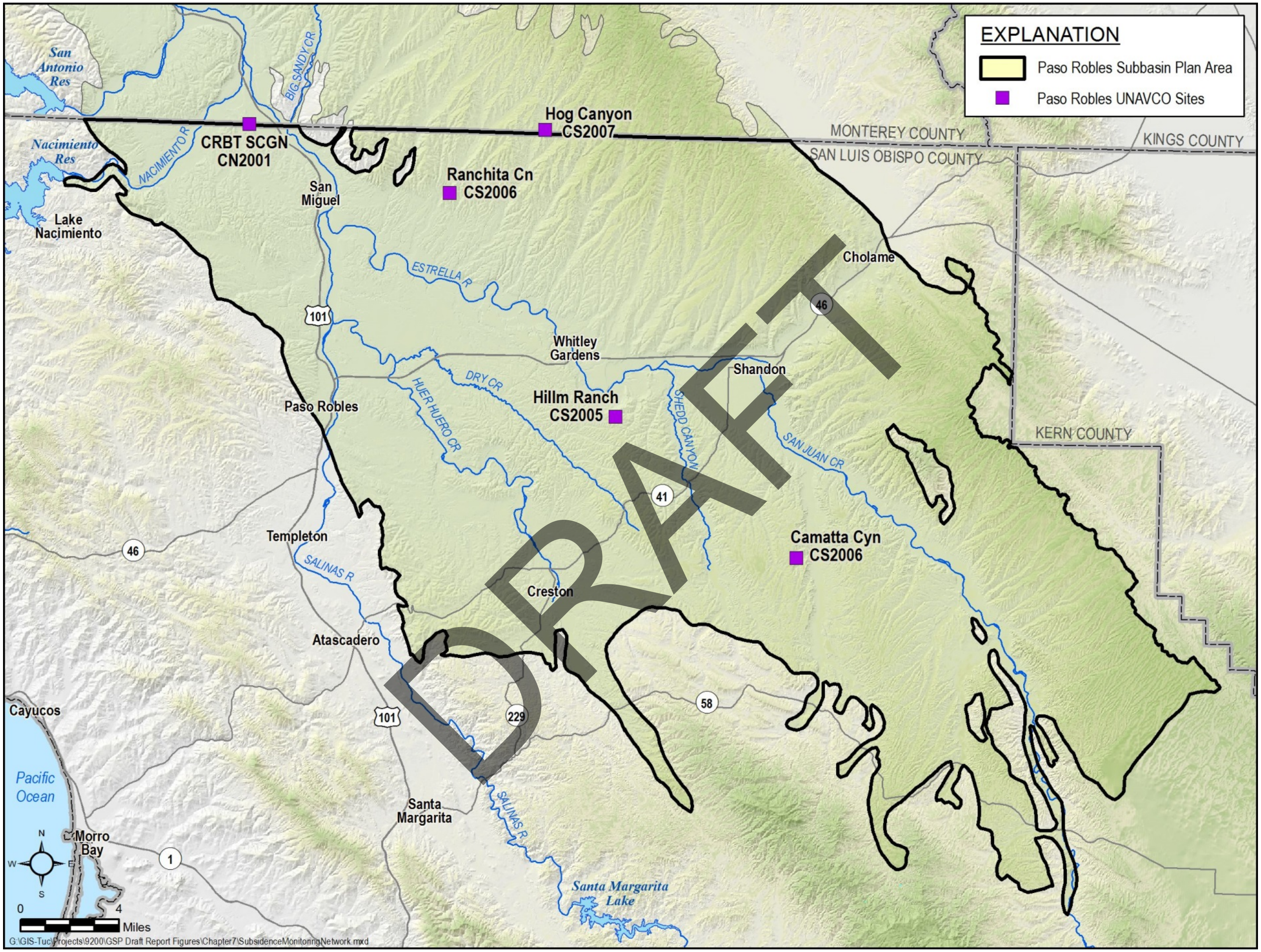


Figure 7-5. Land Subsidence Monitoring Network

Table 7-5. Land Subsidence Monitoring Network

Station ID	Log Time Interval	Name	Latitude	Longitude	Earliest Measurement Date
CRBT	15.0 sec	CRBT SCGN CN2001	35.79161	-120.75075	2001 Sep 13
P531	15.0 sec	Hog Canyon CS2007	35.79269	-120.5366	2007 Jan 17
P527	15.0 sec	Ranchita Cn CS2006	35.75414	-120.60475	2006 Aug 30
P530	15.0 sec	Hillm Ranch CS2005	35.6248	-120.48043	2005 Jul 08
P280	15.0 sec	Camatta Cyn CS2006	35.54405	-120.34761	2006 Jun 23

7.5.1 Land Subsidence Monitoring Data Gaps

Available data indicate that there is currently no long-term subsidence occurring in the Subbasin that affects infrastructure. There are no data gaps identified with the subsidence network at this time.

7.5.2 Land Subsidence Monitoring Protocols

The BMP notes that no standard procedures exist for collecting subsidence data. For the Subbasin, the protocol for monitoring subsidence will be to download the most recent time-series data for the five CGPS sites on an annual basis. The data collected and processed by UNAVCO will continue to be used for monitoring subsidence. If additional datasets become available, they will be evaluated and incorporated into the monitoring program if appropriate. If the annual monitoring indicates subsidence is occurring at a rate greater than the minimum thresholds, then additional investigation and monitoring may be warranted. The GSAs will also consider subsidence surveys published by the USGS and DWR in assessing land subsidence across the Subbasin.

7.6 Interconnected Surface Water Monitoring Network

As discussed in Chapter 5, the consensus among local groundwater experts is that there is no interconnection between surface water and groundwater in the Subbasin. Therefore, there is no need for a monitoring network that quantifies surface water depletion from interconnected surface waters. However, there is a need to verify whether or not there are interconnected surface waters in the Subbasin. The assessment of whether or not there are interconnected surface waters will be evaluated by monitoring surface water and groundwater in areas where interconnected surface water conditions may exist. Shallow monitoring well data will be collected and compared to the surveyed thalweg of adjacent streams, rivers, or wetlands. In accordance with the assessment of wells discussed in Section 7.2, wells were not identified that met the criteria for including them in a monitoring network for monitoring shallow groundwater levels adjacent to streams, rivers, or wetlands in the Alluvial Aquifer.

7.6.1 Interconnected Surface Water Monitoring Data Gaps

Data gaps have been identified to assess the existence of interconnected surface water bodies in the Subbasin. The initial data gap is the lack of wells that monitor the shallow groundwater table adjacent to streams and rivers. Chapter 5 presented an evaluation of potential shallow groundwater in the Alluvial Aquifer near streams and rivers water based on the GSP model. These areas of potential shallow groundwater in the Alluvial Aquifer will be targeted as areas where shallow groundwater wells are needed. Based on this analysis, the locations of either existing shallow monitoring wells that must be identified, or new monitoring wells that must be installed are shown on Figure 7-7.

If the shallow monitoring wells indicate interconnected surface water bodies in the Subbasin, additional analysis will be undertaken to quantify the surface water depletion and potentially relate the quantified surface water depletion rates to shallow groundwater elevations. The surface water depletion rates will be quantified with the GSP model or other appropriate means, including incorporating the existing stream gauging programs described in Chapter 3.

If the shallow monitoring wells indicate interconnected surface water bodies in the Subbasin, additional data gaps may be identified to address all of the SGMA regulations including the following:

- Establishing flow conditions including surface water discharge, surface water head, and baseflow contribution.
- Establishing the approximate date and location where ephemeral or intermittent flowing streams and rivers cease to flow, if applicable.
- Establishing temporal change in conditions due to variations in stream discharge and regional groundwater extraction.

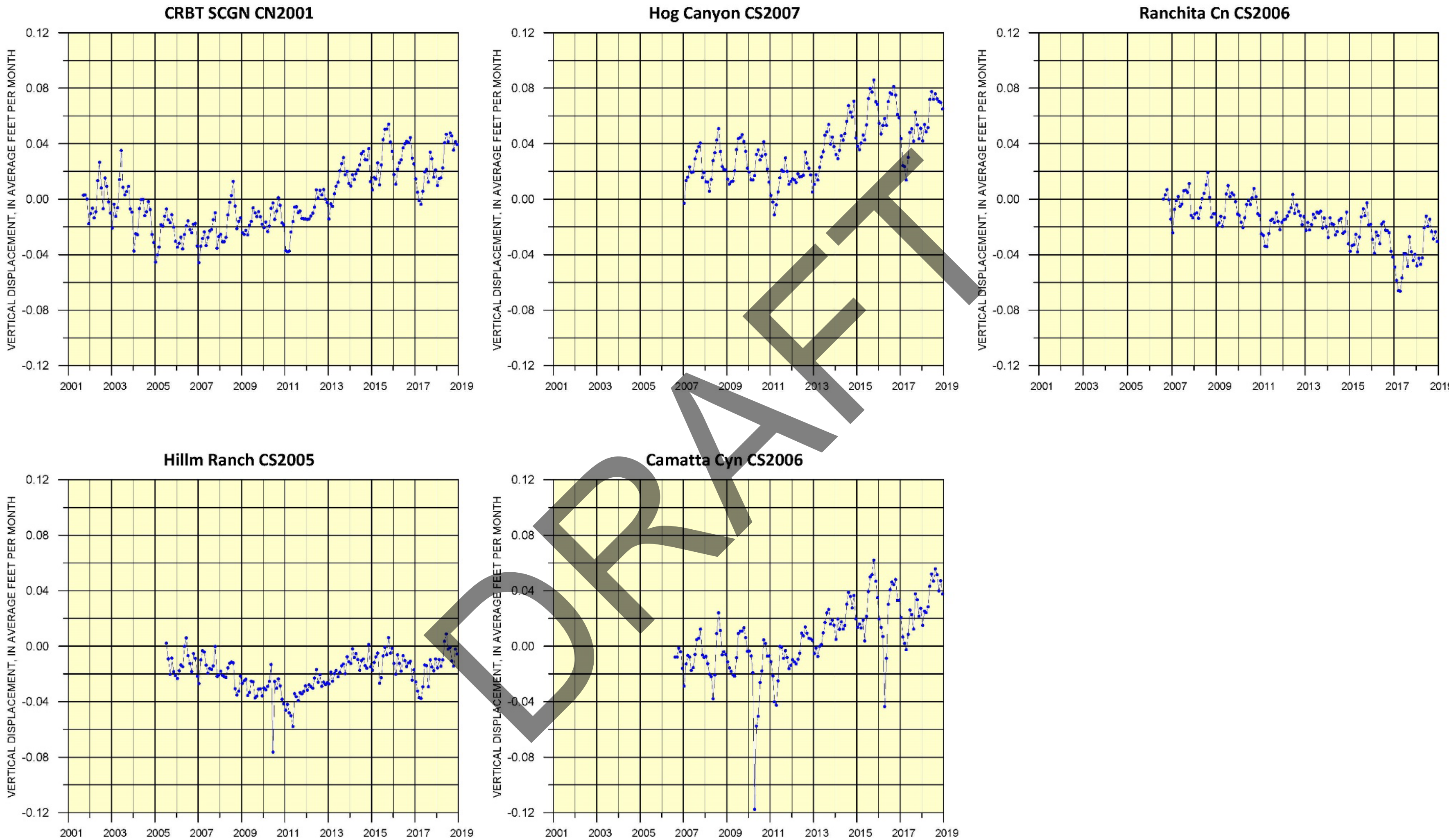


Figure 7-6. Monthly Averages of Vertical Displacement at UNAVCO Continuous GPS Stations

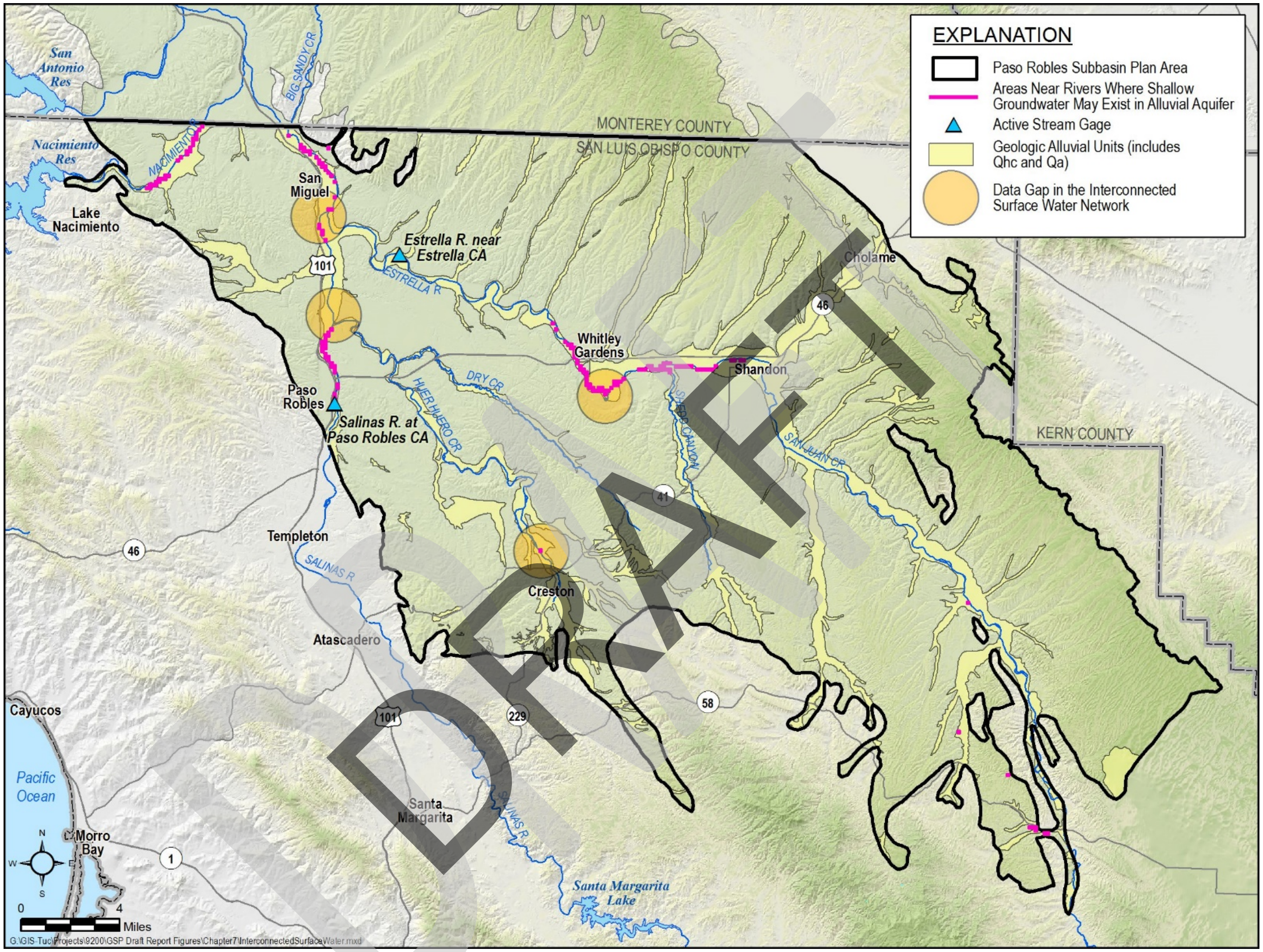


Figure 7-7. Data Gaps in the Interconnected Surface Water Monitoring Well Network

7.6.2 Interconnected Surface Water Monitoring Protocols

Stream gauging is currently being conducted by the USGS according to the protocol outlined in the BMP. Water level monitoring will be conducted in accordance the protocols described in the water level monitoring network section of this chapter.

7.7 Representative Monitoring Sites

Representative monitoring sites (RMS) are defined in the SGMA regulations as a subset of monitoring sites that are representative of conditions in the Subbasin. All of the monitoring sites in this chapter are considered RMS.

7.8 Data Management System and Data Reporting

The SGMA regulations provide broad requirements on data management, stating that a GSP must adhere to the following guidelines for a DMS:

- Article 3, Section 352.6: Each Agency shall develop and maintain a data management system that is capable of storing and reporting information relevant to the development or implementation of the GSP and monitoring of the Subbasin.
- Article 5, Section 354.40: Monitoring data shall be stored in the data management system developed pursuant to Section 352.6. A copy of the monitoring data shall be included in the Annual Report and submitted electronically on forms provided by the Department.

The Paso Robles Subbasin Data Management System (DMS) will be used for the organization, review, and uploading of data to implement the GSP. All data stored in the DMS have a unique identifier and a quality control check was performed on the data.

The Paso Robles Subbasin DMS was developed in Microsoft Access and contains the following main tables:

- **Well_Info** - General information about a well, including identifiers used by various agencies.
- **Site_Info** - Site information about a well, recharge site, or diversion; including location, elevation, and address information
- **Well_Constr** - Well construction information including depth, diameter, etc.
- **Well_Constr_Screen**- Supplements **Well_Constr** with well screen information. One well can have multiple screens.

- **Well_Geologic_Aquifer** - Information about the aquifer parameters of the well such as pumping test information, confinement, and transmissivity.
- **Well_Geologic_Lithology** - Lithologic information at a well site. Each well may have multiple lithologies at different depths.
- **Water_Level** - Water level measurements for wells
- **Well_Pumping** - Pumping measurements for wells, annual or monthly
- **SW_Recharge** - Recharge measurements for a recharge site, annual or monthly
- **SW_Diversion** - Diversion volume measurements for a diversion site, annual or monthly
- **Water_Quality** - Water quality data for wells or other type of site

Data sources used to populate the Paso Robles DMS are listed on Table 7-6. Categories marked with an X indicate datasets that are publicly accessible.

Table 7-6. Data Sources Used to Populate DMS

Data Sets	Data Category: Well and site info	Well construction	Aquifer properties and lithology (data to be added)	Water level	Pumping (data to be added)	Recharge (data to be added)	Diversion (data to be added)	Water quality
DWR (CASGEM)	X	X		X				
San Luis Obispo County	X	X		X				
Geotracker GAMA	X							X

Data were compiled and reviewed to comply with data quality objectives. The review included the following checks:

- Identifying outliers that may have been introduced during the original data entry process by others.
- Removing or flagging questionable data being uploaded in the DMS. This applies to historic water level data, water quality data, and water level over time.

The data were loaded into the database and checked for errors and missing data. Error tables were developed to identify water level and/or well construction data that were missing. For water level data, another data quality check was completed by plotting well hydrographs to identify and remove anomalous data points.

In the future, well log information will be entered for selected wells and other information will be added as needed to satisfy the requirements of the SGMA regulations. The DMS will be migrated to a web-based DMS managed by the County of San Luis Obispo that is currently being planned and developed as part of the San Luis Obispo Valley Basin GSP development process.

DRAFT

Paso Robles Subbasin
Groundwater Sustainability Plan
Chapter 8 Sustainable Management Criteria

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

February 28, 2019

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8 SUSTAINABLE MANAGEMENT CRITERIA

This chapter defines the conditions that constitute sustainable groundwater management, discusses the process by which the four GSAs in the Subbasin will characterize undesirable results, and establishes minimum thresholds and measurable objectives for each sustainability indicator.

This is the fundamental chapter that defines sustainability in the Subbasin, and it addresses significant regulatory requirements. The measurable objectives, minimum thresholds, and undesirable results presented in this chapter define the future sustainable conditions in the Subbasin and commit the GSAs to actions that will achieve these future conditions.

Defining Sustainable Management Criteria (SMC) requires significant analysis and scrutiny. This chapter presents the data and methods used to develop Sustainable Management Criteria and demonstrate how they influence beneficial uses and users. The Sustainable Management Criteria presented in this chapter are based on currently available data and application of the best available science. As noted in this GSP, data gaps exist in the hydrogeologic conceptual model. Uncertainty caused by these data gaps was considered when developing the Sustainability Management Criteria. Due to uncertainty in the hydrogeologic conceptual model, the Sustainable Management Criteria presented herein are considered initial criteria and will be reevaluated and potentially modified in the future as new data become available.

This chapter is organized to address all of the SGMA regulations regarding Sustainable Management Criteria. The SGMA regulations are extensive. To retain an organized approach, this chapter follows the same structure for each sustainability indicator.

The Sustainable Management Criteria are grouped by sustainability indicator. Each section follows a consistent format that contains the information required by Section 354.22 *et. seq* of the SGMA regulations and outlined in the Sustainable Management Criteria BMP (DWR, 2017). Each Sustainable Management Criteria section includes a description of:

- How locally defined significant and unreasonable conditions were developed
- How minimum thresholds were developed, including:
  - The information and methodology used to develop minimum thresholds (§354.28 (b)(1))
  - The relationship between minimum thresholds and the relationship of these minimum thresholds to other sustainability indicators (§354.28 (b)(2))
  - The effect of minimum thresholds on neighboring basins (§354.28 (b)(3))
  - The effect of minimum thresholds on beneficial uses and users (§354.28 (b)(4))

- How minimum thresholds relate to relevant Federal, State, or local standards (§354.28 (b)(5))
    - The method for quantitatively measuring minimum thresholds (§354.28 (b)(6))
- How measurable objectives were developed, including:
    - The methodology for setting measurable objectives (§354.30)
    - Interim milestones (§354.30 (a), §354.30 (e), §354.34 (g)(3))
- How undesirable results were developed, including:
    - The criteria defining when and where the effects of the groundwater conditions cause undesirable results based on a quantitative description of the combination of minimum threshold exceedances (§354.26 (b)(2))
    - The potential causes of undesirable results (§354.26 (b)(1))
    - The effects of these undesirable results on the beneficial users and uses (§354.26 (b)(3))

8.1 Definitions

The SGMA legislation and SGMA regulations contain a number of new terms relevant to the Sustainable Management Criteria. These terms are defined below using the definitions included in the SGMA regulations (§ 351, Article 2). Where appropriate, additional explanatory text is added in italics. This explanatory text is not part of the official definitions of these terms. To the extent possible, plain language, including limited use of overly technical terms and acronyms, was used so that a broad audience will understand the development process and implications of the Sustainable Management Criteria.

- **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.

Interconnected surface waters are parts of streams, lakes, or wetlands where the groundwater table is at or near the ground surface and there is water in the lakes, streams, or wetlands.

- **Interim milestone** refers to a target value representing measurable groundwater conditions, in increments of five years, set by an Agency as part of a Plan.

Interim milestones are targets such as groundwater elevations that will be achieved every five years to demonstrate progress towards sustainability.

- **Management area** refers to an area within a basin for which the Plan may identify different minimum thresholds, measurable objectives, monitoring, or projects and management actions based on differences in water use sector, water source type, geology, aquifer characteristics, or other factors.

- **Measurable objectives** refer to specific, quantifiable goals for the maintenance or improvement of specified groundwater conditions that have been included in an adopted Plan to achieve the sustainability goal for the basin.

Measurable objectives are goals that the GSP is designed to achieve.

- **Minimum thresholds** refer to numeric values for each sustainability indicator used to define undesirable results.

Minimum thresholds are indicators of an unreasonable condition. For example, current groundwater elevations may be a minimum threshold because lower groundwater elevations result in significant and unreasonable costs.

- **Representative monitoring** refers to a monitoring site within a broader network of sites that typifies one or more conditions within the basin or an area of the basin.
- **Sustainability indicator** refers to any of the effects caused by groundwater conditions occurring throughout the basin that, when significant and unreasonable, cause undesirable results, as described in Water Code Section 10721(x).

The five sustainability indicators relevant to this subbasin include chronic lowering of groundwater levels; reduction of groundwater storage; degraded water quality; land subsidence; and depletion of interconnected surface waters.

- **Uncertainty** refers to a lack of understanding of the basin setting that significantly affects an Agency's ability to develop sustainable management criteria and appropriate projects and management actions in a Plan, or to evaluate the efficacy of Plan implementation, and therefore may limit the ability to assess whether a basin is being sustainably managed.
- **Undesirable Result**

There is no formal definition of undesirable result in the definitions section of the SGMA regulations. However, the description of undesirable result in § 354.26 of the SGMA regulations states that it should be "… a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin." An example undesirable result could be when more than a certain % of the measured groundwater levels in an area of the basin fall below the minimum thresholds. Undesirable results should not be confused with significant and unreasonable conditions. Significant and unreasonable conditions are physical conditions to be avoided; an undesirable result is a quantitative assessment based on minimum thresholds.

8.2 Sustainability Goal

Per Section §354.24 of the SGMA regulations, the sustainability goal for the Subbasin has three parts:

- A description of the sustainability goal;
- A discussion of the measures that will be implemented to ensure the Subbasin will be operated within sustainable yield, and;
- An explanation of how the sustainability goal is likely to be achieved.

The goal of this GSP is to sustainably manage the groundwater resources of the Paso Robles Subbasin for long-term community, financial, and environmental benefit of residents and business in the Subbasin. This GSP outlines the approach to achieve a sustainable groundwater resource free of undesirable results within 20 years, while maintaining the unique cultural, community, and business aspects of the Subbasin. In adopting this GSP, it is the express goal of the GSAs to balance the needs of all groundwater users in the Subbasin, within the sustainable limits of the Subbasin's resources.

The following information will be updated when the GSP is completed.

A number of projects and management actions are included in this GSP. Some combination of these projects and management actions will be implemented to ensure the Subbasin is operated within its sustainable yield and achieves sustainability. These projects and management actions include:

- Tiered groundwater pumping fees.
- Progressive ramp down of the groundwater pumping rates to the sustainable yield.
- Expanded use of recycled water.
- Entering into either long-term or short-term contracts for excess surface water from the Nacimiento Reservoir that can offset groundwater pumping.
- Entering into long-term or short-term subcontracts for State Water Project water from the Coastal Branch Aqueduct.
- Developing storm water infiltration projects in appropriate areas of the Subbasin.
- A project to increase reservoir storage behind the Salinas Dam; and a cost analysis and marketability study of delivered water.
- Implementation of enhanced best management practices for crop irrigation, including irrigation system efficiency.

The projects and management actions are designed to achieve sustainability within 20 years by the following means:

- Tiered groundwater pumping fees will promote conservation and fund water supply projects. The tiered fees will be established to promote pumping within the sustainable yield. Pumping that exceeds the sustainable yield will be subject to the higher tiered fees that will fund projects the GSAs find to be cost effective solutions to sustainable management.
- Diligent adherence to Best Management Practices and increased awareness will result in decreased groundwater use.
- Pumping rates will be ramped down until the cumulative pumping rate is at or below the sustainable yield of the Subbasin. This ensures that the future pumping is within the sustainable yield, which will prevent further lowering of groundwater levels.
- Expanded use of recycled water will offset groundwater pumping in the Subbasin. This will contribute to reducing groundwater pumping below its current levels and prevent further lowering of groundwater levels.
- Long-term and short-term contracts for excess surface water from the Nacimiento Reservoir will offset groundwater pumping in the Subbasin. This will contribute to reducing groundwater pumping below its current levels and prevent further lowering of groundwater levels.
- Long-term and short-term contracts for State Water Project water from the Coastal Branch Aqueduct will offset groundwater pumping in the Subbasin. This will contribute to reducing groundwater pumping below its current levels and prevent further lowering of groundwater levels.
- Storm water infiltration projects will increase basin recharge.
- Increased reservoir storage behind the Salinas Dam could provide additional water for either direct or in-lieu recharge.
- Enhanced best management practices for crop irrigation will minimize water loss from irrigation systems and agricultural reservoirs.

8.3 General Process for Establishing Sustainable Management Criteria

The Sustainable Management Criteria presented in this chapter were developed using information from public surveys, public meetings, hydrogeologic analysis, and meetings with GSA staff and Cooperative Committee members. The process built on the Paso Robles Basin's long history of interested parties - including rural residents, farmers of irrigated properties, local cities, and the County - holding public meetings to work on protecting the groundwater resource.

The general process for establishing Sustainable Management Criteria included:

- Holding a series of public outreach meetings that outlined the GSP development process and introduced stakeholders to Sustainable Management Criteria.
- Surveying the public and gathering input on minimum thresholds and measurable objectives. The survey questions were designed to get public input on all five sustainability indicators applicable to the Subbasin. A summary of the survey results is included in the Communications and Engagement Plan, Appendix F.
- Analyzing survey results to assess preferences and trends relevant to Sustainable Management Criteria. Survey results and public comments from outreach meetings were analyzed to assess if different areas in the Subbasin had different preferences for minimum thresholds and measurable objectives.
- Combining survey results, outreach efforts, and hydrogeologic data to set initial minimum thresholds and measurable objectives. This included analyzing historical and current groundwater levels and estimating current surface water depletion rates using the updated GSP model of the Subbasin.
- Conducting public meetings to present initial minimum thresholds and measurable objectives and receive additional public input. Three meetings on Sustainable Management Criteria were held in the Subbasin.
- Reviewing public input on preliminary Sustainable Management Criteria with GSA staff.
- Modifying minimum thresholds and measurable objectives based on feedback from the public meetings and input from GSA staff.

8.4 Chronic Lowering of Groundwater Levels Sustainable Management Criteria

8.4.1 Locally Defined Significant and Unreasonable Conditions

Locally defined significant and unreasonable conditions were determined based on the Sustainable Management Criteria survey, public meetings, available data, and discussions with GSA staff. Significant and unreasonable groundwater levels in the Subbasin are those that:

- Cause significant financial burden to local agricultural interests or others who rely on the groundwater basin

- Impact the ability of existing domestic wells of average depth compared to other domestic wells in the area to produce adequate water for domestic purposes.
- Interfere with other sustainability indicators

8.4.2 Minimum Thresholds

Section §354.28(c)(1) of the SGMA regulations states that "*The minimum threshold for chronic lowering of groundwater levels shall be the groundwater elevation indicating a depletion of supply at a given location that may lead to undesirable results.*"

8.4.2.1 Information and Methodology Used to Establish Minimum Thresholds and Measurable Objectives

The information used for establishing the chronic lowering of groundwater levels minimum thresholds include:

- Information about public definitions of significant and unreasonable conditions and desired groundwater elevations, gathered from the SMC survey and public outreach meetings.
- Feedback about significant and unreasonable conditions gathered during public meetings.
- Historical groundwater elevation data from wells monitored by the County of San Luis Obispo
- Depths and locations of existing wells
- Maps of current and historical groundwater elevation data

Initial minimum thresholds and measurable objectives were established using the process illustrated in Figure 8-1.

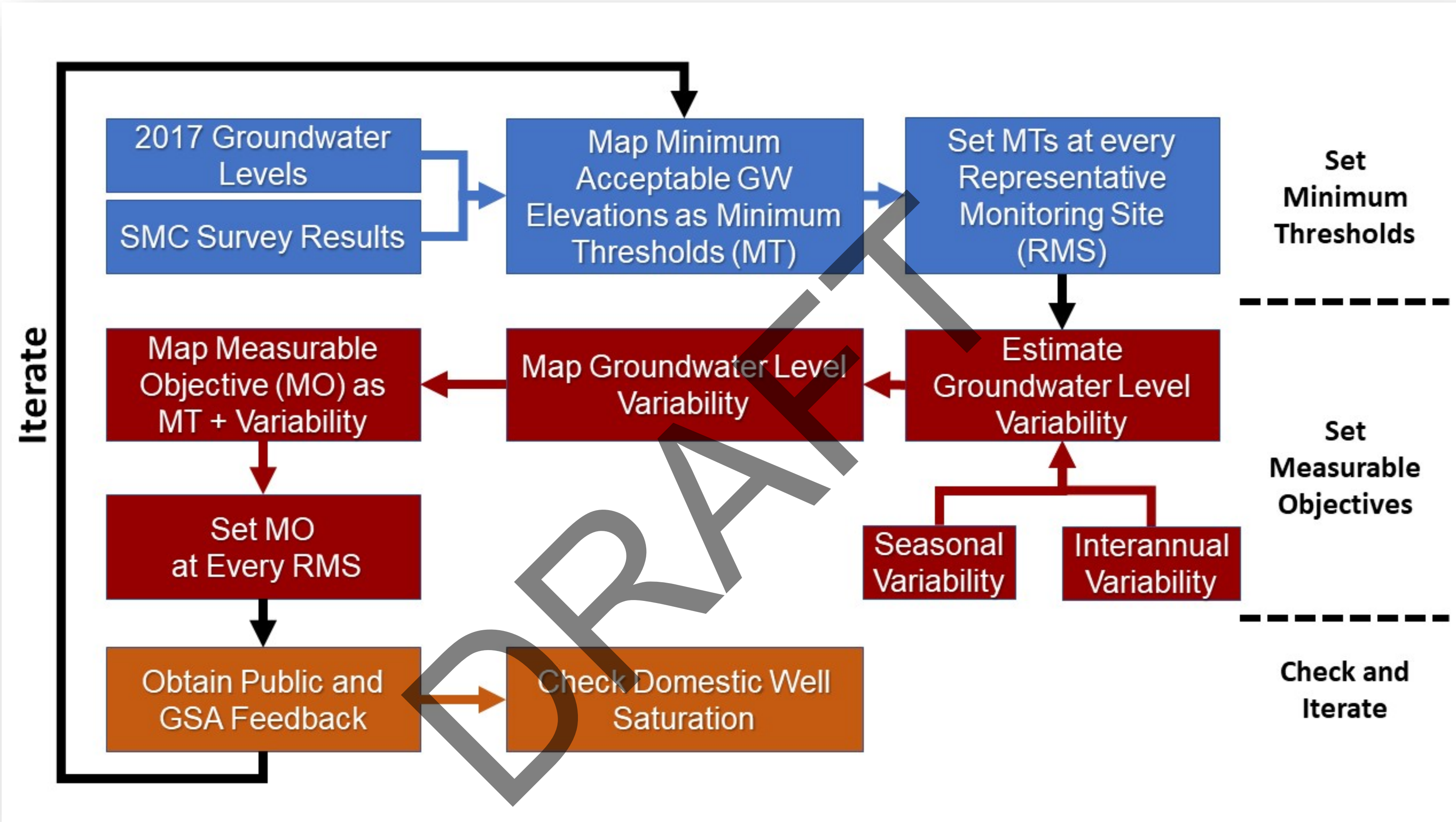


Figure 8-1. Process for Developing Groundwater Elevation Minimum Thresholds and Measurable Objectives

The SMC survey (Appendix F) provided information on stakeholders' preferences for future groundwater levels. The survey results suggested:

- Agricultural stakeholders east of the City of Paso Robles found current groundwater elevations acceptable, but did not want groundwater elevations to drop further.
- Stakeholders near Shandon found current groundwater elevations acceptable.
- Domestic well owners in the areas around Creston, El Pomar, and the Jardin area (east of the Paso Robles Airport) indicated that current groundwater elevations were too low and they preferred higher groundwater elevations similar to those in 2007.

Based on the survey and public outreach results, historical groundwater elevations from monitoring wells that represented desired conditions were identified. These desired conditions were used to establish the initial minimum thresholds in the Subbasin.

Paso Robles Formation Aquifer. Initial minimum thresholds were set using 2017 groundwater elevations from wells east of the City of Paso Robles and in the Shandon area; and 2007 groundwater elevations from wells in the Creston and El Pomar areas. Groundwater elevations from these years were identified as minimum acceptable conditions in the SMC survey results and public meetings.

Alluvial Aquifer. Groundwater level data in the Alluvial Aquifer are limited, and those data that are available have been collected in wells that are subject to confidentiality agreements. Therefore, no groundwater level measurements are used to define the Alluvial Aquifer minimum thresholds at this time.

The data collected from each aquifer were used to develop groundwater elevation maps of the initial minimum thresholds for each aquifer. Figure 8-2 shows a contour map of initial minimum thresholds for the Paso Robles Formation Aquifer. The map was prepared using the 2017 and 2007 groundwater elevation data. Figure 8-3 shows a contour map of initial minimum thresholds for the Alluvial Aquifer. These initial minimum thresholds were established based on 2007 simulated groundwater levels from the GSP model. The 2007 groundwater levels were used to map minimum thresholds because shallow domestic wells are often screened in the alluvial aquifer; and domestic well owners preferred to set minimum thresholds using 2007 groundwater elevations. Figure 8-3 shows the simulated 2007 groundwater elevations in the Alluvial Aquifer, along with the extent of the simulated Alluvial Aquifer and the extent of the mapped Alluvial Aquifer.

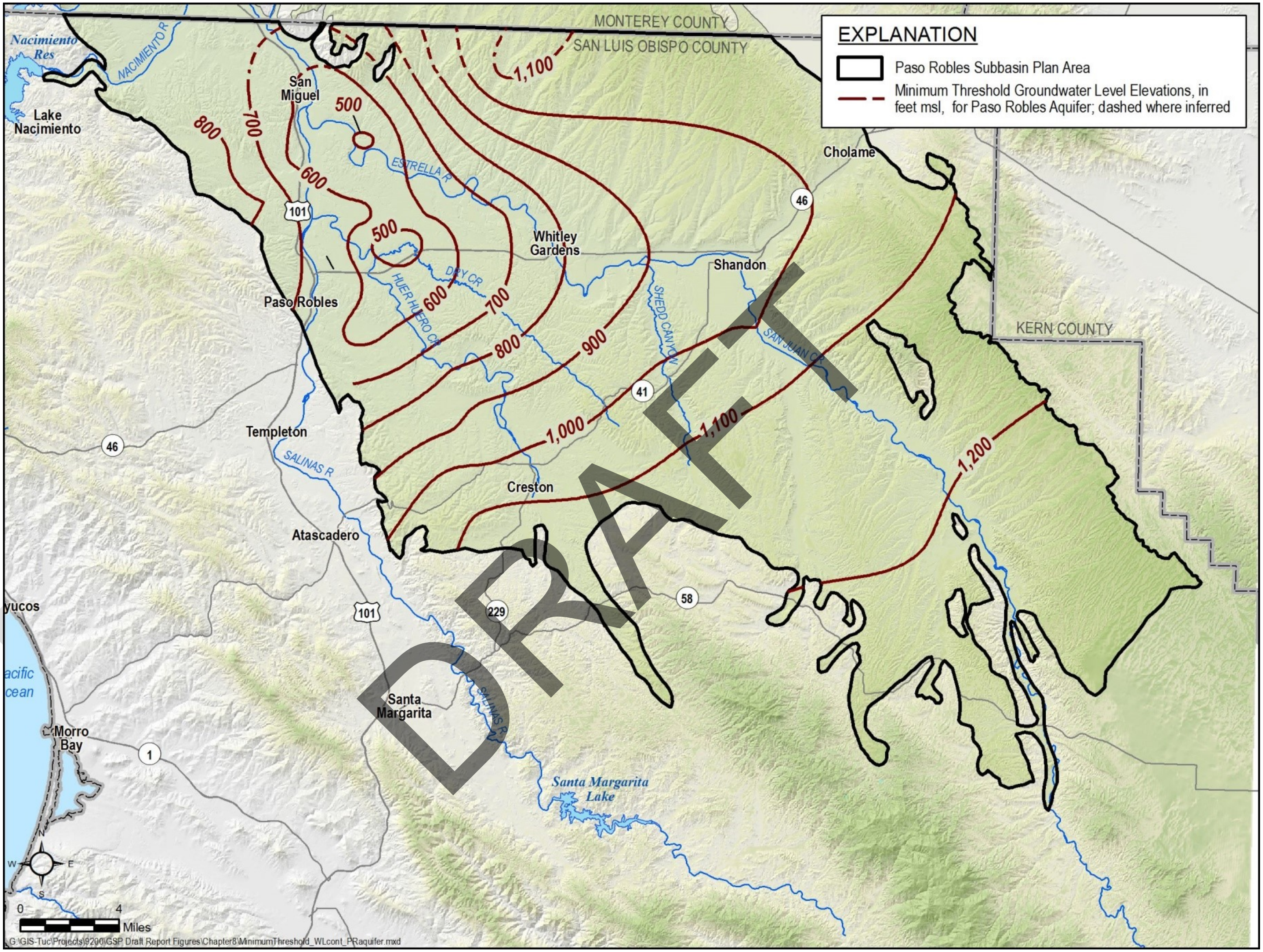


Figure 8-2. Groundwater Elevation Minimum Threshold Surface in the Paso Robles Formation Aquifer

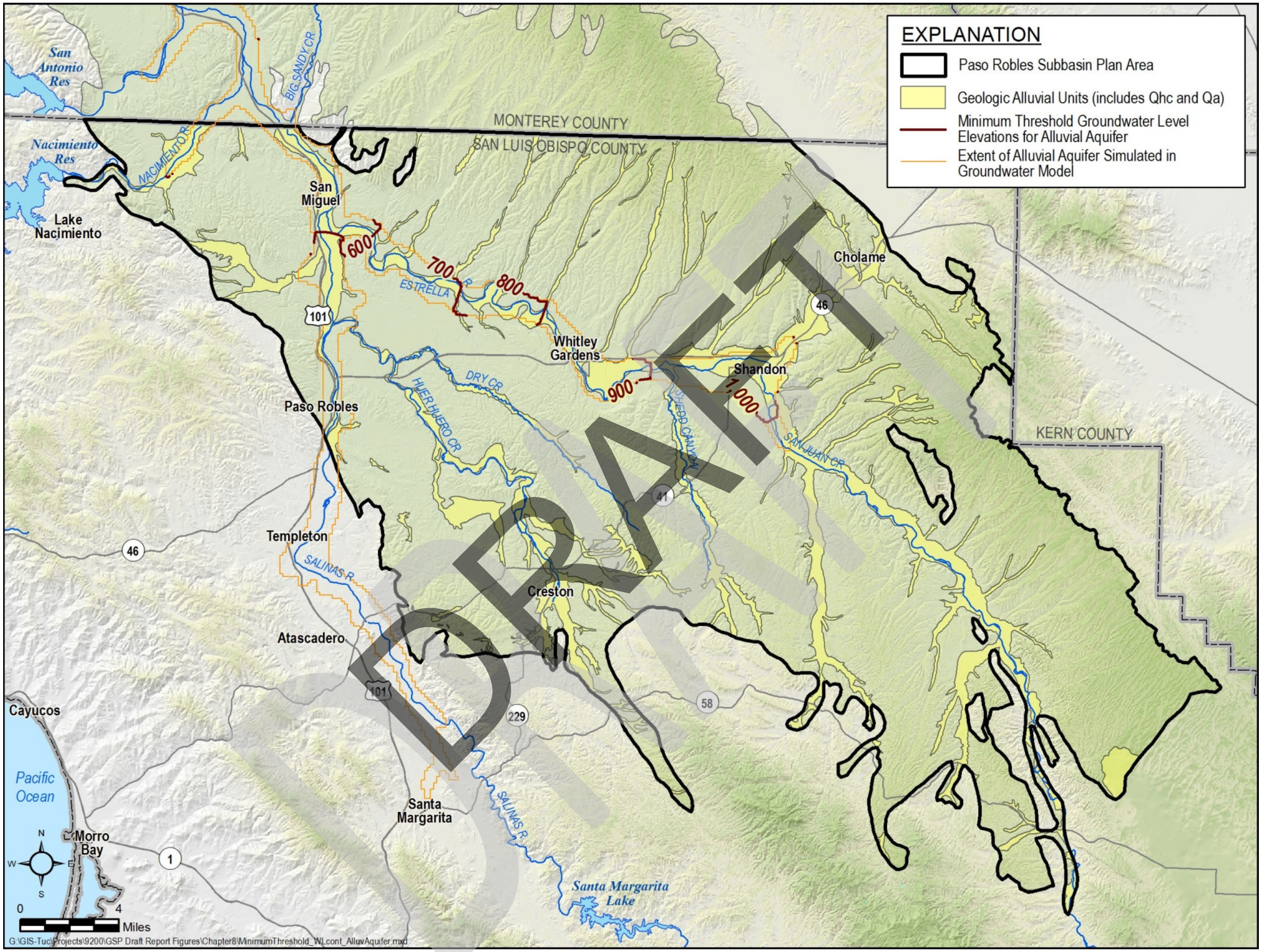


Figure 8-3. Groundwater Elevation Minimum Threshold Surface in the Alluvial Aquifer

Initial minimum thresholds were established for each RMS from the minimum threshold maps shown above. Minimum thresholds for the Paso Robles Formation Aquifer were set using the groundwater elevation contours on Figure 8-2. The mapped groundwater elevation at each RMS location was selected as the initial minimum threshold.

Wells currently being monitored in the Alluvial Aquifer are all subject to confidentiality agreements. Data from these wells cannot be currently reported to a public database. Therefore, minimum thresholds have not been set for any specific RMS in the Alluvial Aquifer. Locating existing wells, or installing new wells, in the Alluvial Aquifer that can be used as an RMS is identified as a data gap in Chapter 7.

When RMSs become available for the Alluvial Aquifer, minimum thresholds will be set at the RMS using the following approach:

1. The minimum threshold for any proposed RMS that has historical groundwater level data will be based on the 2007 groundwater elevation.
2. If the RMS does not have historical data, the minimum threshold will be based on simulated 2007 groundwater elevations. The simulated alluvial aquifer does not cover the entire alluvial aquifer, and therefore the GSP model may need to be refined before minimum thresholds can be developed based on simulated results.

8.4.2.2 Paso Robles Formation Aquifer Minimum Thresholds

Minimum thresholds for each groundwater level RMS in the Paso Robles Formation Aquifer are summarized on Table 8-1. Hydrographs for each RMS with well completion information, and minimum thresholds are included in Appendix G. These minimum thresholds were selected to avoid the locally defined significant and unreasonable conditions.

Table 8-1. Chronic Lowering of Groundwater Levels Minimum Thresholds

Monitoring Site	Aquifer	Minimum Threshold (feet NAVD88)
25S/12E-16K05	Paso Robles	537.0
25S/12E-26L01	Paso Robles	490.2
25S/13E-08L02	Paso Robles	915.6
26S/12E-26E07	Paso Robles	648.5
26S/13E-08M01	Paso Robles	612.8
26S/13E-16N01	Paso Robles	588.1
26S/15E-20B02	Paso Robles	968.6
27S/12E-13N01	Paso Robles	741.2
27S/13E-28F01	Paso Robles	907.7
27S/13E-30N01	Paso Robles	871.1
27S/14E-29G01	Paso Robles	1011.3
28S/13E-01B01	Paso Robles	1058.5

8.4.2.3 Alluvial Aquifer Minimum Thresholds

All wells shown in Table 8-1 are completed in the Paso Robles Formation Aquifer. Monitor wells do not currently exist in the Alluvial Aquifer that can be used for measuring minimum thresholds. This is a data gap identified in Chapter 7. Once this data gap is addressed, minimum thresholds will be set for the Alluvial Aquifer. The methodology that will be used to establish specific minimum thresholds for new wells in the Alluvial Aquifer using the methodology described above.

8.4.2.4 Minimum Thresholds Impact on Domestic Wells

Minimum thresholds for groundwater elevations are compared to the range of domestic well depths in the Subbasin from DWR's Online System for Well Completion Reports (OSWCR) database. This check was done to assure that the minimum thresholds maintain operability in most domestic wells. This check was done for three areas with clusters of domestic wells:

1. Creston and El Pomar areas
2. Estrella area and area of the Paso Robles Airport (Jardin area)
3. Shandon area

The OSWCR database is used to maintain consistency with well data used in the basin setting chapter (Chapter 4). The proposed minimum thresholds for groundwater elevation do not need to protect all domestic wells because it is impractical to manage a basin to the shallowest well. Furthermore, the OSWCR database may include shallow wells that have been abandoned, destroyed, or deepened. Therefore, the analysis discussed below may be overly conservative because the shallowest domestic wells that are not protected by the minimum thresholds may no longer exist.

The comparison showed:

- In the Creston and El Pomar areas, 79% of all domestic wells will have at least 25 feet of water in them as long groundwater levels remain above minimum thresholds; and 86% of all domestic wells will have at least 25 feet of water in them when measurable objectives are achieved.
- In the Estrella and Jardin areas, 80% of all domestic wells will have at least 25 feet of water in them as long groundwater levels remain above minimum thresholds; and 90% of all domestic wells will have at least 25 feet of water in them when measurable objectives are achieved.
- In the Shandon area, 89% of all domestic wells will have at least 25 feet of water in them as long groundwater levels remain above minimum thresholds; and 93% of all domestic wells will have at least 25 feet of water in them when measurable objectives are achieved.

8.4.2.5 Relationship between Individual Minimum Thresholds and Relationship to Other Sustainability Indicators

Section 354.28 of the SGMA regulations requires that the description of all minimum thresholds include a discussion about the relationship between the minimum thresholds for each sustainability indicator. In the SMC BMP (DWR, 2017), DWR has clarified this requirement. First, the GSP must describe the relationship between each sustainability indicator's minimum threshold (e.g., describe why or how a water level minimum threshold set at a particular representative monitoring site is similar to or different to water level thresholds in nearby representative monitoring sites). Second, the GSP must describe the relationship between the selected minimum threshold and minimum thresholds for other sustainability indicators (e.g., describe how a water level minimum threshold would not trigger an undesirable result for land subsidence).

The groundwater elevation minimum thresholds are derived from smoothly interpolated groundwater elevation maps of the entire Subbasin, based on our current understanding of the Subbasin hydrogeology. Therefore, the minimum thresholds are unique at every well, but when combined represent a reasonable and potentially realistic groundwater elevation map. Because the individual minimum thresholds at each RMS are derived from this single map, they do not conflict with each other. As more sites are added to the monitoring system, this contour map will be reinterpreted to create a more refined representation of the minimum thresholds.

Groundwater elevation minimum thresholds can influence other sustainability indicators. The groundwater elevation minimum thresholds are selected to avoid undesirable results for other sustainability indicators.

- **Change in groundwater storage**. A significant and unreasonable condition for change in groundwater storage is pumping in excess of the sustainable yield for an extended period of years. Pumping at or less than the sustainable yield will maintain or raise average groundwater elevations in the Subbasin. The groundwater elevation minimum thresholds are set at or above existing groundwater elevations, consistent with the practice of pumping at or less than the sustainable yield. Therefore, the groundwater elevation minimum thresholds will not result in long term significant or unreasonable change in groundwater storage.
- **Seawater intrusion**. This sustainability indicator is not applicable to this Subbasin
- **Degraded water quality**. Protecting groundwater quality is critically important to all who depend upon the groundwater resource, particularly for drinking water and agricultural uses. A significant and unreasonable condition for degraded water quality is exceeding regulatory limits for constituents of concern in supply wells due to actions proposed in the GSP. Water quality could be affected through two processes:
    1. Low groundwater elevations in an area could cause deeper, poor-quality groundwater to flow upward into existing supply wells. Groundwater elevation minimum thresholds are set at or above current levels, avoiding upward flow of deep, poor-quality groundwater that would not otherwise occur. The groundwater elevation minimum thresholds will avoid poor-quality water from impacting existing supply wells.
    2. Changes in groundwater elevation due to actions implemented to achieve sustainability could change groundwater gradients, which could cause poor quality groundwater to flow towards supply wells that would not have otherwise been impacted. These groundwater gradients, however, are only dependent on differences between groundwater elevations, not on the groundwater elevations themselves. Therefore, the minimum threshold groundwater elevations do not directly lead to a significant and unreasonable degradation of groundwater quality in production wells.
- **Subsidence**. A significant and unreasonable condition for subsidence is any measurable permanent subsidence that damages existing infrastructure. Subsidence is caused by dewatering and compaction of clay-rich sediments in response to lowering groundwater levels. Very small amounts of land surface elevation fluctuations have been reported across the Basin. The groundwater elevation minimum thresholds are set at or above existing groundwater elevations and will not induce additional subsidence that has not already started.

- **Depletion of interconnected surface waters.** The assessment of local groundwater experts is that there are not interconnected surface waters in the Subbasin. Therefore, there are no current minimum thresholds or undesirable results that could be affected by the groundwater elevation minimum thresholds. Changes in groundwater elevations, however, could reconnect surface waters. If this occurs, minimum thresholds will be established for depletion of interconnected surface waters and the relationship between those new minimum thresholds and all other sustainability indicators will be reassessed.

8.4.2.6 Effect of Minimum Thresholds on Neighboring Basins

One neighboring groundwater basin is required to develop a GSP: the Upper Valley Subbasin of the Salinas Valley Basin. Additionally, the adjoining Atascadero Subbasin is currently developing a GSP under SGMA. The anticipated effect of the groundwater elevation minimum thresholds on each of the two subbasins is addressed below.

Upper Valley Subbasin of the Salinas Valley Basin. The Upper Valley Subbasin is required to develop a GSP by 2022. The Upper Valley Subbasin is hydrogeologically downgradient of the Paso Robles Subbasin: groundwater generally flows from the Paso Robles Subbasin into the Upper Valley Subbasin. Lower groundwater levels in the Paso Robles Subbasin as a result of GSP actions could reduce the amount of groundwater flowing into the Upper Valley Subbasin, affecting that Subbasin's ability to achieve sustainability. The groundwater elevation minimum thresholds are set at sustainable levels that are at or above current elevations, therefore the minimum thresholds will not reduce groundwater flow into the adjacent Upper Valley Subbasin.

The Paso Robles Subbasin GSAs have developed a cooperative working relationship with the Salinas Valley Basin GSA who will be developing the GSP for the Upper Valley Subbasin. The two GSAs will monitor and work together to ensure that minimum thresholds do not significantly reduce groundwater flow into the Upper Valley Subbasin to the degree that would prevent that subbasin from achieving sustainability.

Atascadero Subbasin. The Paso Robles Subbasin is hydrogeologically separated from the Atascadero Subbasin by the Rinconada Fault. The fault acts as a barrier to groundwater flow as presented in Chapter 4. Because minimum thresholds are set at or above current groundwater levels, there will be negligible impact on groundwater elevations in the Atascadero Subbasin. The Paso Robles Subbasin GSAs have a cooperative working relationship with the Agencies managing the Atascadero Subbasin and will continue to work together to ensure that minimum thresholds do not significantly affect each Subbasin's ability to achieve sustainability.

8.4.2.7 Effects on Beneficial Users and Land Uses

The groundwater elevation minimum thresholds may have several effects on beneficial users and land uses in the Subbasin.

Agricultural land uses and users. The groundwater elevation minimum thresholds limit lowering of groundwater levels in the Subbasin. This has the effect of limiting the amount of groundwater pumping in the Subbasin. Limiting the amount of groundwater pumping will limit the amount and type of crops that can be grown in the Subbasin, which could result in a proportional reduction in the economic viability of some properties. The groundwater elevation minimum thresholds could therefore limit expansion of the Subbasin's agricultural economy. This could have various effects on beneficial users and land uses:

- Agricultural land with pumping allowances may become more valuable as bringing new lands into irrigation becomes more difficult and expensive.
- Agricultural land that does not have a pumping allowance may become less valuable because it may be too difficult and expensive to irrigate.
- There will be an economic impact to employees and suppliers of production products and materials. Many parts of the local economy rely on a vibrant agricultural industry and they too will be hurt proportional to the losses imparted to agricultural businesses.
- Growth of city, county and state tax rolls could be slowed or reduced due to the limitations imposed on agricultural growth.

Urban land uses and users. The groundwater elevation minimum thresholds effectively limit the amount of groundwater pumping in the Subbasin. This may limit urban growth, or result in urban areas obtaining alternative sources of water. This may result in higher water costs for municipal water users.

Domestic land uses and users. The groundwater elevation minimum thresholds protect most domestic wells. Therefore, the minimum thresholds will likely have an overall beneficial effect on existing domestic land uses by protecting the ability to pump from domestic wells. However, limited water ins some of the shallowest domestic wells may require owners to drill deeper wells. Additionally, the groundwater elevation minimum thresholds may limit the number of new domestic wells that can be drilled in order to limit future declines in groundwater levels caused by more domestic pumping. Policies allowing offsets of existing use to allow new construction or bringing in new sources of water can mitigate against this effect.

Ecological land uses and users. Groundwater elevation minimum thresholds effectively protect the groundwater resource including those existing ecological habitats that rely upon it. As noted above, groundwater level minimum thresholds may limit both agricultural and rural residential growth. Ecological land uses and users may benefit by this reduction in agricultural and rural residential growth.

8.4.2.8 Relevant Federal, State, or Local Standards

No Federal, State, or local standards exist for chronic lowering of groundwater elevations.

8.4.2.9 Method for Quantitative Measurement of Minimum Thresholds

Groundwater elevation minimum thresholds will be directly measured from existing or new monitoring wells. The groundwater level monitoring will be conducted in accordance with the monitoring plan outlined in Chapter 7. Furthermore, the groundwater level monitoring will meet the requirements of the technical and reporting standards included in the SGMA regulations.

As noted in Chapter 7, the current groundwater monitoring network in the Paso Robles Formation Aquifer currently only includes 12 wells. For the Alluvial Aquifer, a groundwater level monitoring network cannot be established for the GSP because monitoring wells where data can be reported do not exist. The GSAs will expand the monitoring network in both aquifers during GSP implementation.

8.4.3 Measurable Objectives

The measurable objectives for chronic lowering of groundwater levels represent target groundwater elevations that are higher than the minimum thresholds. These measurable objectives provide operational flexibility to ensure that the Subbasin can be managed sustainably over a reasonable range of hydrologic variability.

8.4.3.1 Methodology for Setting Measurable Objectives

The methodology for establishing measurable objectives is described on Figure 8-1 and summarized below.

Measurable Objectives for groundwater levels were established by analyzing measured groundwater level hydrographs and estimating the well-by-well historical groundwater level variability. This analysis provides estimates of the expected groundwater level variability due to climatic variability. Both inter-annual (i.e., the variability from year to year) and seasonal variability were considered. Figure 8-4 shows an example of how groundwater level variability was estimated at each well.

Paso Robles Formation Aquifer. The magnitude of inter-annual variability was estimated for specific monitoring sites by reviewing changes in average groundwater levels over periods with variable precipitation, but without substantial changes in cropping patterns. This approach is illustrated using an example hydrograph as shown on Figure 8-4. The blue bands identify wet periods with little change in cropping. The gray band identifies a dry period with little change in cropping. The horizontal blue lines identify the average fall groundwater elevations during the wet periods. The horizontal red line identifies the average fall groundwater elevations during the dry period. The difference between the horizontal blue lines in the horizontal red line is an expected change in average, inter-annual groundwater levels due to climatic variability. The inter-annual variability for this well for this period is approximately 20 feet. The dashed orange lines on Figure 8-4 project the inter-annual variability to the minimum threshold, showing how the inter-annual variability is part of the difference between the minimum threshold and measurable objective.

Seasonal variability is quantified as the maximum annual change between measured spring and fall groundwater levels. The hydrograph shown on Figure 8-4 has a maximum seasonal change of 61 feet. Assuming half of the 61 feet represents a groundwater level drop from average conditions and half of the 61 feet represents a rise in groundwater levels from average conditions, the seasonal drop in groundwater elevations may be up to 30.5 feet.

The sum of the inter-annual variability and one-half of the seasonal variability defines the total variability expected at each well based on historical data. For the well represented by the hydrograph on Figure 8-4, the total variability is 50.5 feet. Therefore, the measurable objective is set 50.5 feet above the minimum threshold. The measurable objective and minimum threshold for this well are shown on Figure 8-4, with the minimum threshold being the lower red line and the measurable objective being the upper black line of the box on the right side of the figure. Each measurable objective and minimum threshold are adjusted, if needed to match the hydrograph of that well.

Alluvial Aquifer. The wells used in this analysis for the Alluvial Aquifer are currently confidential, and so the locations of those wells and their associated hydrographs cannot be shown in the GSP. Based on analysis of the Alluvial Aquifer wells, the typical range of seasonal variability is about 10 feet. Typical inter-annual variability associated with successive dry years is about 10 feet along the Estrella River. Wells completed in the Alluvial Aquifer along the Salinas River show little or no response to periods of successive dry years. The relatively stable conditions in the Alluvial Aquifer along the Salinas River are likely due to a combination of regulated flows from the operation of Santa Margarita reservoir and percolation of treated wastewater. Based on the results of this analysis, the measurable objective groundwater levels were set 10 feet above the minimum threshold surface along the Salinas River, and 20 feet above the minimum threshold surface along the Estrella River.

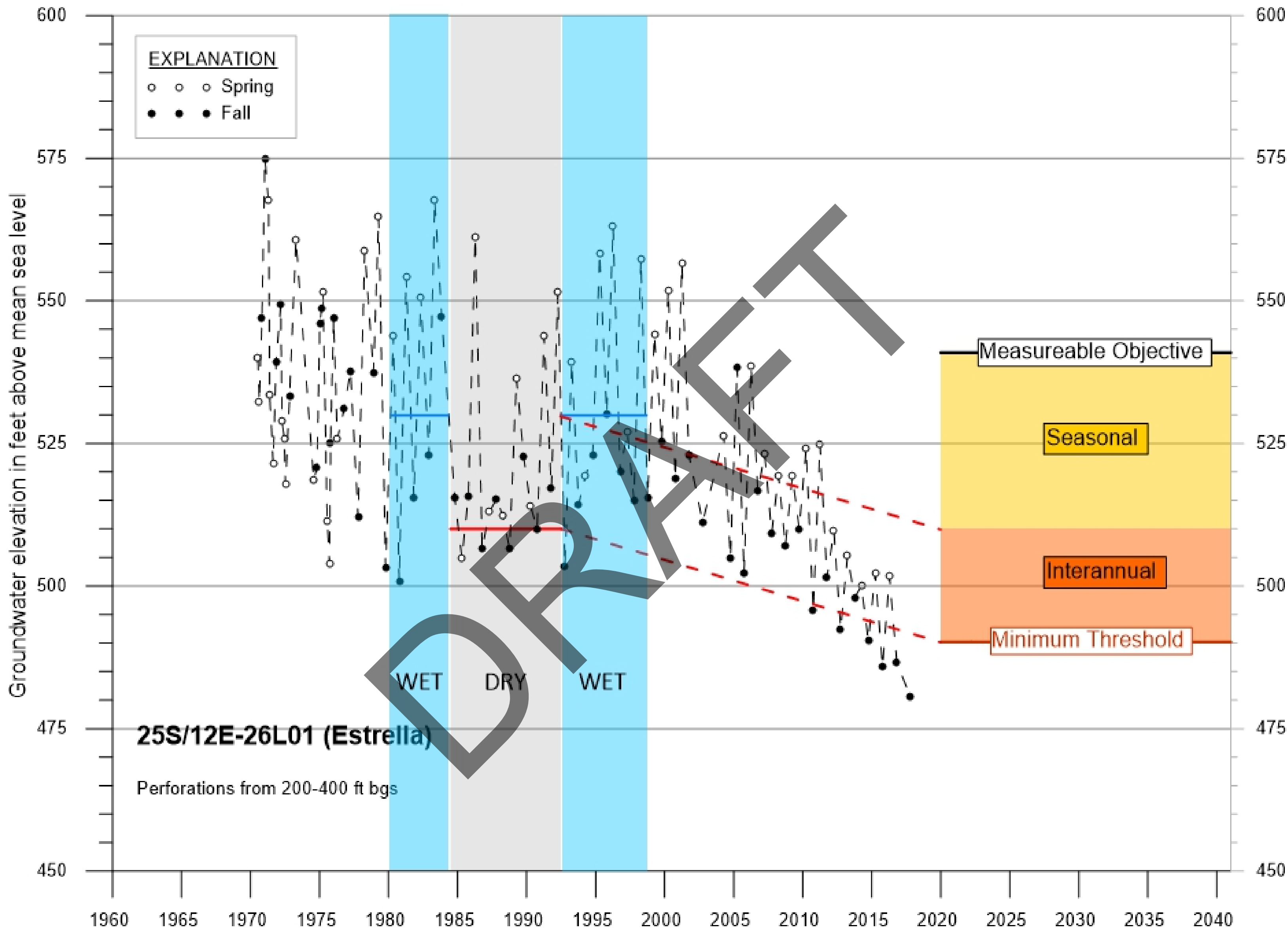


Figure 8-4. Method for Estimating Minimum Thresholds from Groundwater Level Variability

The elevation differences between minimum thresholds and measurable objectives established at individual monitoring sites are contoured across the basin. These contours are then added to the minimum threshold groundwater level map to develop a measurable objective contour map. The measurable objective map for the Paso Robles Formation Aquifer is shown on Figure 8-5. The measurable objective map for the Alluvial Aquifer is shown on Figure 8-6.

The measurable objective map is used to establish measurable objectives at each RMS. The RMS location is compared to the measurable objective contours, and a measurable objective is selected from the map contours. This process will be repeated in the future as more RMSs are added.

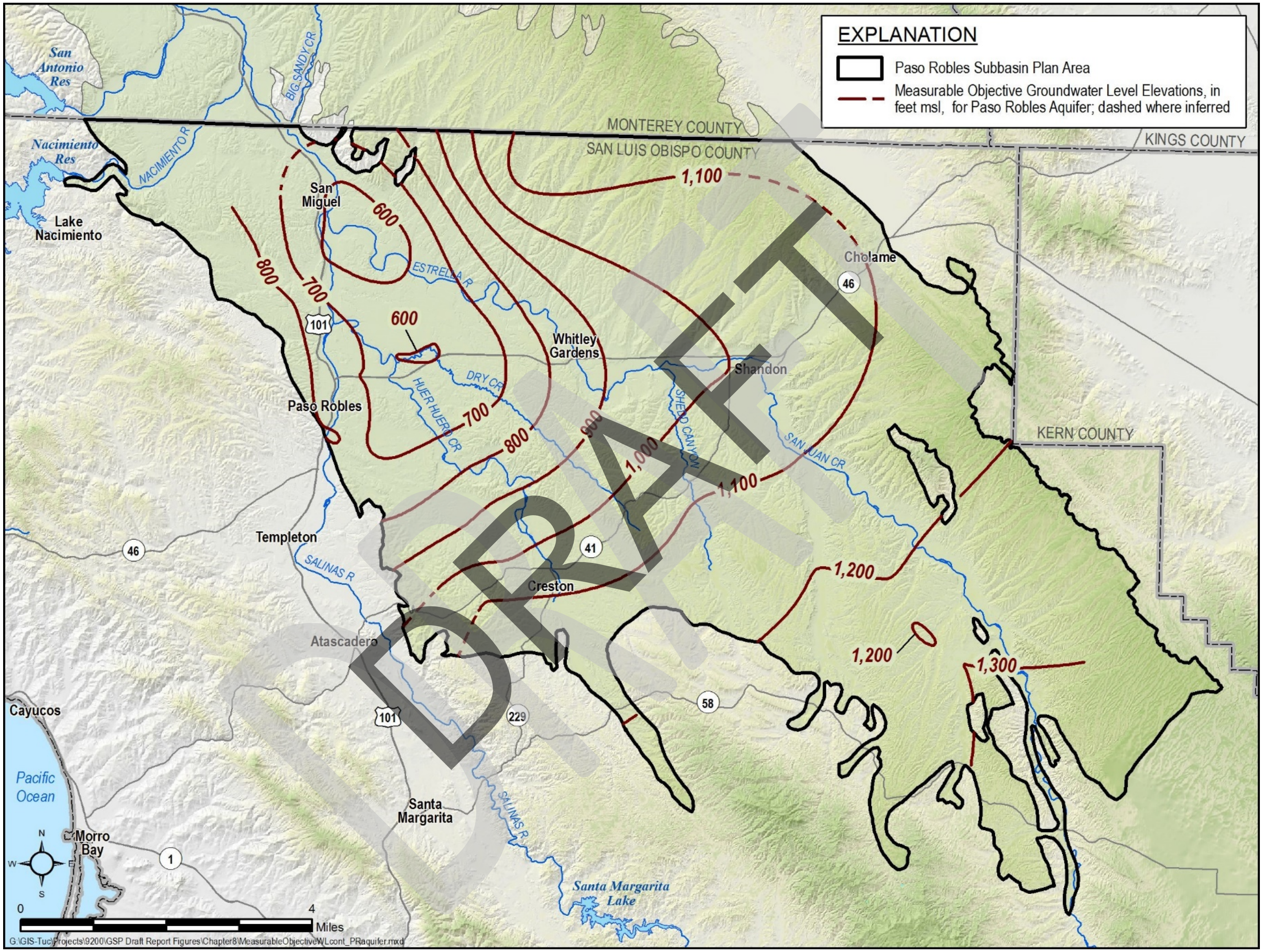


Figure 8-5. Groundwater Elevation Measurable Objective Surface in the Paso Robles Formation Aquifer

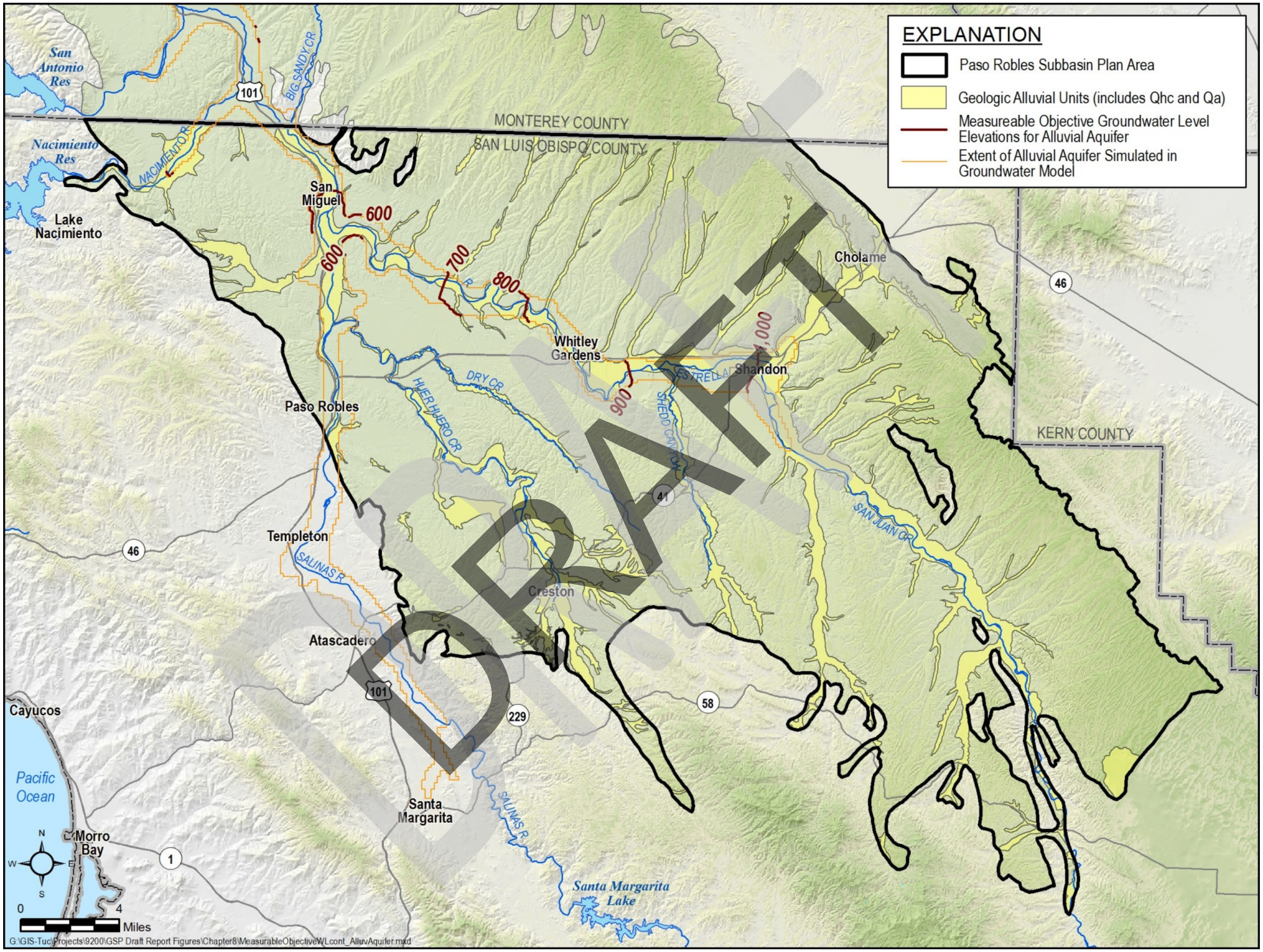


Figure 8-6. Groundwater Elevation Measurable Objective Surface in the Alluvial Aquifer

8.4.3.2 Paso Robles Formation Aquifer Measurable Objectives

Measurable objectives for each groundwater level RMS in the Paso Robles Formation Aquifer are summarized on Figure 8-5. Hydrographs for each RMS with well completion information, and measurable objectives are included in Appendix G.

Table 8-2. Chronic Lowering of Groundwater Levels Measurable Objectives

Monitoring Site	Aquifer	Measurable Objective (feet NAVD88)
25S/12E-16K05	Paso Robles	574.4
25S/12E-26L01	Paso Robles	540.9
25S/13E-08L02	Paso Robles	929.4
26S/12E-26E07	Paso Robles	692.3
26S/13E-08M01	Paso Robles	643.6
26S/13E-16N01	Paso Robles	615.0
26S/15E-20B02	Paso Robles	1023.5
27S/12E-13N01	Paso Robles	760.4
27S/13E-28F01	Paso Robles	933.0
27S/13E-30N01	Paso Robles	892.1
27S/14E-29G01	Paso Robles	1039.0
28S/13E-01B01	Paso Robles	1076.2

8.4.3.3 Alluvial Aquifer

All wells shown in Table 8-1 are completed in the Paso Robles Formation Aquifer. Monitor wells do not currently exist in the Alluvial Aquifer that can be used for establishing measurable objectives. This is a data gap identified in Chapter 7. Once this data gap is addressed, measurable objectives will be set for the Alluvial Aquifer.

8.4.3.4 Interim Milestones

To be developed after projects and implementation schedule are developed.

8.4.4 Undesirable Results

8.4.4.1 Criteria for Defining Undesirable Results

The chronic lowering of groundwater elevation undesirable result is a quantitative combinations of groundwater elevation minimum threshold exceedances. For the Paso Robles Subbasin, the groundwater elevation undesirable result is:

Over the course of any one year, no more than 15% of the groundwater elevation minimum thresholds shall be exceeded in any single aquifer.

Undesirable results provide flexibility in defining sustainability. Increasing the percentage of allowed minimum threshold exceedances provides more flexibility, but may lead to significant and unreasonable conditions for a number of beneficial users. Reducing the percentage of allowed minimum threshold exceedances ensures strict adherence to minimum thresholds, but reduces flexibility due to unanticipated hydrogeologic conditions. The undesirable result was set at 15% to balance the interests of beneficial users with the practical aspects of groundwater management under uncertainty.

The 15% limit on minimum threshold exceedances in the chronic lowering of groundwater level undesirable result allows for two exceedances in the 12 existing monitoring wells. As the monitoring system grows, additional exceedances will be allowed. One additional exceedance will be allowed for approximately every seven new monitoring wells. This was considered a reasonable number of exceedances given the hydrogeologic uncertainty of the basin. Close monitoring of groundwater data over the following years will allow that percentage to be refined based on observable data. Management of the Basin will adapt to specific conditions and to a growing understanding of basin conditions and processes to adopt appropriate responses.

8.4.4.2 Potential Causes of Undesirable Results

An undesirable result for chronic lowering of groundwater levels does not currently exist. Conditions that may lead to an undesirable result include the following:

- **Localized pumping clusters**. Even if regional pumping is maintained within the sustainable yield, clusters of high-capacity wells may cause excessive localized drawdowns that lead to undesirable results in specific areas.
- **Expansion of *de-minimis* pumping**. Individual *de-minimis* pumpers do not have a significant impact on Subbasin-wide groundwater elevations. However, many *de-minimis* pumpers are often clustered in specific residential areas. Pumping by these *de-minimis* users is not currently regulated under this GSP. Adding additional domestic *de-minimis* pumpers in specific areas may result in excessive localized drawdowns and undesirable results.
- **Extensive, unanticipated drought**. Minimum thresholds were established based on historical groundwater elevations and reasonable estimates of future groundwater elevations. Extensive, unanticipated droughts may lead to excessively low groundwater elevations and undesirable results.

8.4.4.3 Effects on Beneficial Users and Land Uses

The primary detrimental effect on beneficial users from allowing multiple exceedances occurs if more than one exceedance occurs in a small geographic area. Allowing 15% exceedances is reasonable as long as the exceedances are spread out across the Subbasin. If the exceedances are clustered in a small area, it will indicate that significant and unreasonable effects are being born by a localized group of landowners.

8.5 Reduction in Groundwater Storage Sustainable Management Criteria

8.5.1 Locally Defined Significant and Unreasonable Conditions

Locally defined significant and unreasonable conditions were assessed based on the Sustainable Management Criteria survey, public meetings, available data, and discussions with GSA staff. Significant and unreasonable changes in groundwater storage in the Subbasin are those that:

- Lead to long-term reduction in groundwater storage
- Interfere with other sustainability indicators

Responses to the Sustainable Management Criteria survey and public input suggest that most areas of the basin would like to see more groundwater in storage to help with droughts, and some areas of the basin would like to see significantly more groundwater in storage. Public input on which concessions would be acceptable to increase the amount of groundwater in storage revealed two highly ranked concessions:

1. New pumping be offset with new recharge or reduced pumping
2. Pumping be reduced in dry years

However, the concession that agricultural pumping be reduced in all years ranked relatively low. This suggests that, while stakeholders would prefer more groundwater in storage, they also would not prefer to reduce existing agricultural pumping during average years. Stakeholders also prefer that groundwater storage be increased by retaining wet year flows for local recharge and/or importing water.

8.5.2 Minimum Thresholds

Section §354.28(c)(2) of the SGMA regulations states that "*The minimum threshold for reduction of groundwater storage shall be a total volume of groundwater that can be withdrawn from the basin without causing conditions that may lead to undesirable results. Minimum thresholds for reduction of groundwater storage shall be supported by the sustainable yield of the basin, calculated based on historical trends, water year type, and projected water use in the basin.*"

The reduction of groundwater in storage minimum threshold is established for the Subbasin as a whole, not for individual aquifers. Therefore, one minimum threshold is established for the entire Subbasin.

In accordance with the SGMA regulation cited above, the minimum threshold metric is a volume of pumping per year, or an annual pumping rate. Conceptually, the total volume of groundwater that can be pumped annually from the Subbasin without leading to undesirable results is equal to the estimated sustainable yield of the Subbasin. As discussed in Chapter 6, the future estimated long-term sustainable yield of the Subbasin under reasonable climate change assumptions is 61,100 AFY. This estimated sustainable yield will change in the future as additional data become available.

This GSP adopts changes in groundwater elevation as a proxy for the change in groundwater storage metric. As allowed in § 354.36(b)(1) of the SGMA regulations, groundwater elevation data at the RMSs will be reported annually as a proxy to track changes in the amount of groundwater in storage.

The minimum threshold for change in groundwater storage is *no long-term change in groundwater storage*. Based on well-established hydrogeologic principles, no change in groundwater storage can be equated to stable groundwater elevations. Therefore, the minimum threshold using groundwater elevations as a proxy is that the groundwater elevation averaged across all the wells in the groundwater level monitoring network will remain stable.

8.5.2.1 Information Used and Methodology for Establishing Reduction in Storage Minimum Thresholds

The monitoring network and protocols used to measure groundwater elevations at the RMS are presented in Chapter 7, Monitoring Networks. These data will be used to monitor groundwater elevations and assess changes in groundwater storage.

8.5.2.2 Relationship between Individual Minimum Thresholds and Relationship to Other Sustainability Indicators

The minimum threshold for reduction in groundwater storage is a single value of average groundwater elevation over the entire Subbasin. Therefore, the concept of potential conflict between minimum thresholds at different locations in the Subbasin is not applicable.

The reduction in groundwater storage minimum threshold could influence other sustainability indicators. The reduction in groundwater storage minimum threshold was selected to avoid undesirable results for other sustainability indicators, as outlined below.

- **Chronic lowering of groundwater levels**. Because groundwater elevations will be used as a proxy for estimating groundwater pumping and changes in groundwater storage, the reduction in groundwater storage would not cause undesirable results for this sustainability indicator.
- **Seawater intrusion**. This sustainability indicator is not applicable to this Subbasin.

- **Degraded water quality**. The minimum threshold proxy of stable groundwater levels will not directly lead to a degradation of groundwater quality.
- **Subsidence**. Because future average groundwater levels will be stable, they will not induce any additional subsidence.
- **Depletion of interconnected surface waters.** Minimum thresholds and undesirable results for interconnected surface water were not developed because interconnected surface water is not believed to exist currently in the Subbasin. Therefore, the reduction in groundwater storage minimum thresholds is unrelated to interconnected surface water at this time. If surface water interconnection is identified in the future, minimum thresholds will be established for depletion of interconnected surface waters and the relationship between those new minimum thresholds and all other sustainability indicators will be reassessed.

8.5.2.3 Effect of Minimum Thresholds on Neighboring Basins

The anticipated effect of the groundwater storage minimum thresholds on each of the two neighboring subbasins is addressed below.

Upper Valley Subbasin of the Salinas Valley Basin. Removing groundwater from storage in the Paso Robles Subbasin would reduce flow into the Upper Valley Subbasin, potentially affecting the ability of that Subbasin to achieve sustainability. The reduction in storage minimum threshold is set to prevent reduction in storage and therefore maintain flow into the Upper Valley Subbasin. This minimum threshold will not prevent the Upper Valley Subbasin from achieving sustainability.

Atascadero Subbasin. The Paso Robles Subbasin is hydrogeologically separated from the Atascadero Subbasin by the Rinconada Fault. The fault acts as a partial barrier to groundwater flow as presented in Chapter 4. Removing groundwater from storage in the Paso Robles Subbasin could induce additional groundwater flow from the Atascadero Subbasin into the Paso Robles Subbasin, affecting the ability to achieve sustainability in the Atascadero Subbasin. The reduction in storage minimum threshold is set to prevent reduction in storage and will be monitored using groundwater elevation proxies, therefore will not induce lowering of groundwater elevations that could cause additional groundwater flows from the Atascadero Subbasin. The minimum threshold will therefore not prevent the Atascadero Subbasin from achieving sustainability.

8.5.2.4 Effect on Beneficial Uses and Users

The reduction in groundwater storage minimum threshold of maintaining stable average groundwater elevations and, by proxy, having no change in storage will potentially require a reduction in the amount of groundwater pumping in the Subbasin. Reducing pumping may impact the beneficial uses and users of groundwater in the Subbasin.

Agricultural land uses and users. Reducing the amount of groundwater pumping may limit or reduce agricultural production in the Subbasin by reducing the amount of available water. Owners of agricultural lands that are currently not irrigated may be particularly impacted because the additional groundwater pumping needed to irrigate these lands could increase the Subbasin pumping beyond the sustainable yield, violating the minimum threshold.

Urban land uses and users. Reducing the amount of groundwater pumping may increase the cost of water for municipal users in the Subbasin because municipalities may need to find other, more expensive water sources.

Domestic land uses and users. Existing domestic groundwater users may generally benefit from this minimum threshold. Many domestic groundwater users are *de-minimis* users whose pumping may not be restricted by the projects and management actions adopted in this GSP. By restricting the amount of groundwater that is pumped from the Subbasin, the *de-minimis* users would be protected from overdraft that could impact their ability to pump groundwater.

Ecological land uses and users. Groundwater dependent ecosystems would generally benefit from this minimum threshold. Maintaining groundwater levels close to current levels maintains groundwater supplies similar to present levels which will continue to support groundwater dependent ecosystems.

8.5.2.5 Relation to State, Federal, or Local Standards

No federal, state, or local standards exist for reductions in groundwater storage.

8.5.2.6 Methods for Quantitative Measurement of Minimum Threshold

The quantitative metric for assessing compliance with the reduction in groundwater storage minimum threshold is monitoring groundwater elevations. The approach for quantitatively evaluating compliance with the minimum threshold for reduction in groundwater storage will be based on evaluating groundwater elevations annually. All groundwater elevations collected from the groundwater level monitoring network will be analyzed and averaged.

8.5.3 Measurable Objectives

The measurable objective for reduction in groundwater storage is the same as the minimum threshold. The measurable objective, using the groundwater level proxy, is stable average groundwater levels.

8.5.3.1 Method for Setting Measurable Objectives

As discussed in Section 8.5.1, input from stakeholders suggested that they would prefer more groundwater in storage. However, stakeholders also suggested that they would prefer not to attain this increase in groundwater storage by reducing existing pumping during years with average climate conditions. Instead, they prefer to increase groundwater storage through increasing local recharge or importing water for recharge. Therefore, the conservative approach of simply maintaining stable groundwater levels was adopted for the measurable objective.

8.5.3.2 Interim Milestones

To be developed after projects and management actions are developed.

8.5.4 Undesirable Results

8.5.4.1 Criteria for Defining Undesirable Results

The reduction in groundwater storage undesirable result is a quantitative combination of reduction in groundwater storage minimum threshold exceedances. However, there is only one reduction in groundwater storage minimum threshold. Therefore, no minimum threshold exceedances are allowed to occur and the reduction in groundwater storage undesirable result is:

During average hydrogeologic conditions, and as a long-term average over all hydrogeologic conditions, there shall be no exceedances of the groundwater level proxy minimum threshold for change in groundwater storage.

8.5.4.2 Potential Causes of Undesirable Results

Conditions that may lead to an undesirable result for the reduction in groundwater storage sustainability indicator include the following:

- **Expansion of agricultural or municipal pumping.** Additional agricultural or municipal pumping may result in continued decline in groundwater elevations and exceedance of the proxy minimum threshold.
- **Expansion of *de-minimis* pumping**. Pumping by *de-minimis* users is not regulated under this GSP. Adding domestic *de-minimis* pumpers in the Subbasin may result in lower groundwater elevations, and an exceedance of the proxy minimum threshold.
- **Extensive, unanticipated drought**. Minimum thresholds are established based on reasonable anticipated future climatic conditions. Extensive, unanticipated droughts may lead to excessively low groundwater recharge and unanticipated high pumping rates that could cause lower groundwater elevations and an exceedance of the proxy minimum threshold.

8.5.4.3 Effects on Beneficial Users and Land Use

The practical effect of the reduction in groundwater storage undesirable result is that it encourages no net change in groundwater elevations and storage during average hydrologic conditions and over the long-term. Therefore, during average hydrologic conditions and over the long-term, beneficial uses and users will have access to the same amount of groundwater in storage that currently exists, and the undesirable result will not have a negative effect on the beneficial users and uses of groundwater. However, pumping at the long-term sustainable yield during dry years will temporarily lower groundwater elevations and reduce the amount of groundwater in storage. Therefore, if this occurs, there could be short-term impacts from a reduction in groundwater in storage on all beneficial users and uses of groundwater. In particular, groundwater pumpers that rely on water from shallower wells may be temporarily impacted as the amount of groundwater in storage drops and water levels in their wells decline.

8.6 Seawater Intrusion Sustainable Management Criteria

The seawater intrusion sustainability indicator is not applicable to this Subbasin.

8.7 Degraded Water Quality Sustainable Management Criteria

8.7.1 Locally Defined Significant and Unreasonable Conditions

Locally defined significant and unreasonable conditions were assessed based on federal and state mandated drinking water and groundwater quality regulations, the Sustainable Management Criteria survey, public meetings, and discussions with GSA staff. Significant and unreasonable changes in groundwater quality in the Subbasin are increases in a chemical constituent that either:

- Result in groundwater concentrations in a public supply well above an established primary or secondary MCL, or
- Lead to reduced crop production.

8.7.2 Minimum Thresholds

Section §354.28(c)(2)of the SGMA regulations states that "*The minimum threshold shall be based on the number of supply wells, a volume of water, or a location of an isocontour that exceeds concentrations of constituents determined by the Agency to be of concern for the basin*."

As stated above, the SGMA regulations allow three options for setting degraded water quality minimum thresholds. In the Subbasin, degraded water quality minimum thresholds are based on a number of supply wells that exceed concentrations of constituents determined to be of concern for the Subbasin. The purpose of the minimum thresholds for constituents of concern with a primary or secondary MCL is to avoid furthering the migration of these constituents towards municipal or other drinking water wells. Therefore, the definition of supply wells for constituents of concern that have a primary or secondary MCL are public supply wells.

The purpose of the minimum thresholds for constituents of concern that may reduce crop productivity is to avoid furthering the migration of these constituents towards agricultural supply wells. Therefore, the definition of supply wells for constituents of concern that may lead to reduced crop production are agricultural supply wells.

As noted in Section 354.28 (c)(4) of the SGMA regulations, minimum thresholds are based on a degradation of groundwater quality, not an improvement of groundwater quality. Therefore, this GSP was developed to avoid taking actions that may inadvertently move groundwater constituents that have already been identified in the Subbasin in such a way that they have a significant and unreasonable impact that would not otherwise occur. Constituents of concern must meet two criteria:

1. They must have an established level of concern such as a primary or secondary MCL or a concentration that reduces crop production
2. They must have previously been found in the Subbasin at levels above the level of concern

Based on the review of groundwater quality in Chapter 5, different constituents of concern exist for both agricultural wells and public supply wells. The constituents of concern for agricultural wells are:

- Chloride
- Boron

The constituents of concern for public supply wells are:

- Total Dissolved Solids
- Chloride
- Sulfate
- Nitrate
- Gross Alpha Radiation

As noted in Section 5.6.3, based on available information there are no mapped groundwater contamination plumes in the Subbasin. Therefore, only potential impacts of diffuse or naturally occurring constituents listed above are addressed in this GSP.

The bases for establishing minimum thresholds for each constituent of concern in the Paso Robles Formation Aquifer and Alluvial Aquifer are listed in Table 8-3. This table does not identify the number of supply wells that will exceed the level of concern, but rather identifies how many additional wells will be allowed to exceed the level of concern. Wells that already exceed this limit are not counted against the minimum thresholds.

Table 8-3. Groundwater Quality Minimum Thresholds Bases

Constituent of Concern	Minimum Threshold Based on Number of Production Wells
Agricultural Wells in Monitoring Program	
Chloride	Zero additional agricultural production wells that are in the GSP monitoring program shall exceed 350 milligrams per liter (mg/L).
Boron	Zero additional agricultural production wells that are in the GSP monitoring program shall exceed 0.5 mg/L.
Municipal Wells in Monitoring Program	
Total Dissolved Solids	Zero additional municipal or domestic production wells that are in the GSP monitoring program shall exceed the TDS secondary MCL of 500 mg/L.
Chloride	Zero additional municipal or domestic production wells that are in the GSP monitoring program shall exceed the chloride secondary MCL of 250 mg/L.
Sulfate	Zero additional municipal or domestic production wells that are in the GSP monitoring program shall exceed the sulfate secondary MCL of 250 mg/L.
Nitrate	Zero additional municipal or domestic production wells that are in the GSP monitoring program shall exceed the nitrate MCL of 45 mg/L, measured as nitrate.
Gross Alpha Radiation	Zero additional municipal or domestic production wells that are in the GSP monitoring program shall exceed the gross alpha radiation MCL of 15 pCi/L.

8.7.2.1 Paso Robles Formation Aquifer

The minimum thresholds for degraded water quality in the Paso Robles Formation Aquifer are based on the goal of zero additional exceedances as shown in Table 8-3. However, some exceedances already exist in Paso Robles Formation Aquifer wells, and these exceedances will likely continue into the future. The minimum threshold for the number of allowed exceedances is therefore equal to the current number of exceedances. Based on the number of agricultural and municipal supply wells in the existing water quality monitoring network that is described in Chapter 7, the number of existing exceedances for each constituent is shown in Table 8-4. The exceedance numbers in this table are the minimum thresholds. This table additionally includes the percentage of existing wells that exceed the minimum thresholds for each constituent. The percentage defines the upper bound of wells that can exceed the minimum thresholds as additional wells are added to the monitoring program.

Table 8-4. Minimum Thresholds for Degraded Groundwater Quality in Paso Robles Formation Aquifer Supply Wells Under the Current Monitoring Network

Constituent of Concern	Number of Existing Supply Wells in Monitoring Network	Minimum Threshold Based on Existing Monitoring Network	Percentage of Wells with Exceedances
Agricultural Wells			
Chloride	28	3	11%
Boron	28	9	32%
Municipal Wells			
Total Dissolved Solids	34	11	32%
Chloride	34	1	3%
Sulfate	34	1	3%
Nitrate	34	1	3%
Gross Alpha Radiation	32	0	0%

8.7.2.2 Alluvial Aquifer

The minimum thresholds for degraded water quality in the Alluvial Aquifer are similarly based on the goal of zero additional exceedances shown in Table 8-3. Following the same process as the Paso Robles Formation Aquifer, the minimum thresholds for degraded water quality in the Alluvial Aquifer are shown in Table 8-5. All agricultural supply wells are assumed to pump from the Paso Robles Formation Aquifer, and therefore there are no agricultural well minimum thresholds set in the Alluvial Aquifer. As with the Paso Robles Formation Aquifer, as additional wells are added to the monitoring program, the percentage of wells exceeding the minimum threshold will not increase.

Table 8-5. Minimum Thresholds for Degraded Groundwater Quality in Alluvial Aquifer Supply Wells Under the Current Monitoring Network

Constituent of Concern	Number of Existing Supply Wells in Monitoring Network	Minimum Threshold Based on Existing Monitoring Network	Percentage of Wells with Exceedances
Public Supply Wells			
Total Dissolved Solids	8	4	50%
Chloride	8	2	25%
Sulfate	8	2	25%
Nitrate	9	0	0%
Gross Alpha Radiation	7	0	0%

8.7.2.3 Information Used and Methodology for Establishing Water Quality Minimum Thresholds

The information used for establishing the degraded groundwater quality minimum thresholds included:

- Historical groundwater quality data from production wells in the Subbasin
- Federal and state drinking water quality standards
- Feedback about significant and unreasonable conditions from GSA staff members and the public

The historical groundwater quality data used to establish groundwater quality minimum thresholds are presented in Chapter 5.

Based on the review of historical and current groundwater quality data, federal and state drinking water standards, and irrigation water quality needs, GSAs agreed that these standards are appropriate to define degraded groundwater quality minimum thresholds.

8.7.2.4 Relationship between Individual Minimum Thresholds and Relationship to Other Sustainability Indicators

The groundwater quality minimum thresholds were set for each of six constituents that are currently found in the Subbasin above water quality standards or irrigation guidance levels. These minimum thresholds were derived from existing data measured at individual wells. There are no conflicts between the existing groundwater quality data; and therefore, the minimum thresholds represent a reasonable and realistic distribution of groundwater quality. Because the underlying groundwater quality distribution is reasonable and realistic, there is no conflict that prevents the Subbasin from simultaneously achieving all six minimum thresholds.

Because SGMA regulations do not require projects or actions to improve groundwater quality, there will be no direct actions under the GSP associated with the groundwater quality minimum thresholds. Therefore, there are no actions that directly influence other sustainability indicators. However, preventing migration of poor groundwater quality may limit activities needed to achieve minimum thresholds for other sustainability indicators.

- **Change in groundwater levels.** Groundwater quality minimum thresholds could influence groundwater level minimum thresholds by limiting the types of water that can be used for recharge to raise groundwater levels. Water used for recharge cannot exceed any of the groundwater quality minimum thresholds.
- **Change in groundwater storage**. Nothing in the groundwater quality minimum thresholds promotes pumping in excess of the sustainable yield. Therefore, the groundwater quality minimum thresholds will not result in an exceedance of the groundwater storage minimum threshold.
- **Seawater intrusion**. This sustainability indicator is not applicable to this Subbasin
- **Subsidence**. Nothing in the groundwater quality minimum thresholds promotes a condition that will lead to additional subsidence and therefore, the groundwater quality minimum thresholds will not result in a significant or unreasonable level of subsidence.
- **Depletion of interconnected surface waters.** Nothing in the groundwater quality minimum thresholds promotes additional pumping or lower groundwater elevations adjacent to interconnected surface waters. Therefore, the groundwater quality minimum thresholds will not result in a significant or unreasonable depletion of interconnected surface waters.

8.7.2.5 Effect of Minimum Thresholds on Neighboring Basins

The anticipated effect of the degraded groundwater quality minimum thresholds on each of the two neighboring subbasins is addressed below.

Upper Valley Subbasin of the Salinas Valley Basin. The Upper Valley Subbasin is hydrogeologically down gradient of the Paso Robles Subbasin, thus groundwater generally flows from the Paso Robles Subbasin into the Upper Valley Subbasin. Poor groundwater quality in the Paso Robles Subbasin could flow into the Upper Valley Subbasin, affecting the ability to achieve sustainability in that Subbasin. The degraded groundwater quality minimum threshold is set to prevent unreasonable movement of poor-quality groundwater that could impact overall beneficial uses of groundwater. Therefore, it is unlikely that the groundwater quality minimum thresholds established for the Paso Robles Subbasin will prevent the Upper Valley Subbasin from achieving sustainability.

Atascadero Subbasin. Groundwater generally flows from the Atascadero Subbasin into the Paso Robles Subbasin. Therefore, poor quality groundwater in the Paso Robles Subbasin is not expected flow into the Atascadero Subbasin in the future, thus the Paso Robles Subbasin groundwater quality minimum thresholds will not likely prevent the Atascadero Subbasin from achieving sustainability.

8.7.2.6 Effect on Beneficial Uses and Users

Agricultural land uses and users. The degraded groundwater quality minimum thresholds generally benefit the agricultural water users in the Subbasin. For example, preventing additional agricultural supply wells from exceeding constituent of concern concentrations that could reduce crop production ensures that a supply of usable groundwater will exist for beneficial agricultural use.

Urban land uses and users. The degraded groundwater quality minimum thresholds generally benefit the urban water users in the Subbasin. Preventing constituents of concern in additional drinking water supply wells from exceeding primary or secondary MCLs ensures an adequate supply of groundwater for municipal use.

Domestic land uses and users. The degraded groundwater quality minimum thresholds generally benefit the domestic water users in the Subbasin. Preventing constituents of concern in additional drinking water supply wells from exceeding primary or secondary MCLs ensures an adequate supply of groundwater for domestic use.

Ecological land uses and users. Although the groundwater quality minimum thresholds do not directly benefit ecological uses, it can be inferred that the degraded groundwater quality minimum thresholds generally benefit the ecological water uses in the Subbasin. Preventing constituents of concern from migrating will prevent unwanted contaminants from impacting ecological groundwater supply.

8.7.2.7 Relation to State, Federal, or Local Standards

The degraded groundwater quality minimum thresholds specifically incorporate federal and state drinking water standards.

8.7.2.8 Method for Quantitative Measurement of Minimum Thresholds

Degraded groundwater quality minimum thresholds will be directly measured from existing or new municipal or agricultural supply wells. Groundwater quality will initially be measured using existing monitoring programs.

- Exceedances of primary or secondary MCLs will be monitored by reviewing annual water quality reports submitted to the California Division of Drinking water by municipalities and small water systems.
- Exceedances of crop production minimum thresholds will be monitored as part of the ILRP as presented in Chapter 7.

8.7.3 Measurable Objectives

The measurable objectives for degraded groundwater quality represent target groundwater quality distributions in the Subbasin. Because improving groundwater quality is not a goal under SGMA, the measurable objectives were set to identical to the minimum thresholds.

8.7.3.1 Paso Robles Formation Aquifer

Based on the existing monitoring network, the measurable objectives for degraded groundwater quality in the Paso Robles Formation Aquifer are shown in Table 8-6.

Table 8-6. Measurable Objectives for Degraded Groundwater Quality in Paso Robles Formation Aquifer Supply Wells Under the Current Monitoring Network

Constituent of Concern	Number of Existing Supply Wells in Monitoring Network	Minimum Threshold Based on Existing Monitoring Network	Percentage of Wells with Exceedances
Agricultural Wells			
Chloride	28	3	11%
Boron	28	9	32%
Municipal Wells			
Total Dissolved Solids	34	11	32%
Chloride	34	1	3%
Sulfate	34	1	3%
Nitrate	34	1	3%
Gross Alpha Radiation	32	0	0%

8.7.3.2 Alluvial Aquifer

Based on the existing monitoring network, the measurable objectives for degraded groundwater quality in the Paso Robles Formation Aquifer are shown in Table 8-7.

Table 8-7. Measurable Objectives for Degraded Groundwater Quality in Alluvial Aquifer Supply Wells Under the Current Monitoring Network

Constituent of Concern	Number of Existing Supply Wells in Monitoring Network	Minimum Threshold Based on Existing Monitoring Network	Percentage of Wells with Exceedances
Public Supply Wells			
Total Dissolved Solids	8	4	50%
Chloride	8	2	25%
Sulfate	8	2	25%
Nitrate	9	0	0%
Gross Alpha Radiation	7	0	0%

8.7.3.3 Method for Setting Measurable Objectives

Because improving groundwater quality is not a goal under SGMA, the measurable objectives were set to identical to the minimum thresholds.

8.7.3.4 Interim Milestones

Interim milestones show how the GSAs anticipate moving from current conditions to meeting the measurable objectives. Interim milestones are set for each five-year interval following GSP adoption.

The measurable objectives for degraded groundwater quality were set at current conditions. Therefore, the expected interim milestones are identical to current conditions. The interim milestones for the constituents in the Paso Robles Formation Aquifer are shown in Table 8-8.

Table 8-8. Interim Milestone Groundwater Quality Exceedances in Paso Robles Formation Aquifer Supply Wells Under the Current Monitoring Network

Constituent of Concern	Five Year Number of Groundwater Quality Exceedances	Ten Year Number of Groundwater Quality Exceedances	Fifteen Year Number of Groundwater Quality Exceedances
Agricultural Supply Wells			
Chloride	3	3	3
Boron	9	9	9
Public supply wells			
Total Dissolved Solids	16	16	16
Chloride	3	3	3
Sulfate	3	3	3
Nitrate	1	1	1
Gross Alpha Radiation	0	0	0

The interim milestones for the constituents in the Alluvial Aquifer are shown in Table 8-9.

Table 8-9. Interim Milestone Groundwater Quality Exceedances in Alluvial Aquifer Supply Wells Under the Current Monitoring Network

Constituent of Concern	5-Year Number of Groundwater Quality Exceedances	10-Year Number of Groundwater Quality Exceedances	15-Year Number of Groundwater Quality Exceedances
Public supply wells			
Total Dissolved Solids	4	4	4
Chloride	2	2	2
Sulfate	2	2	2
Nitrate	0	0	0
Gross Alpha Radiation	0	0	0

8.7.4 Undesirable Results

8.7.4.1 Criteria for Defining Undesirable Results

By SGMA regulations, the degraded groundwater quality undesirable result is a quantitative combination of groundwater quality minimum threshold exceedances. For the Subbasin, groundwater quality degradation is unacceptable only as a direct result of actions taken as part of GSP implementation. Therefore, the degraded groundwater quality undesirable result is:

On average during any one year, no groundwater quality minimum threshold shall be exceeded in any aquifer as a direct result of projects or management actions taken as part of GSP implementation.

8.7.4.2 Potential Causes of Undesirable Results

Conditions that may lead to an undesirable result include the following:

- **Required Changes to Subbasin Pumping**. If the location and rates of groundwater pumping change as a result of projects implemented under the GSP, these changes could cause movement of one of the constituents of concern towards a supply well at concentrations that exceed relevant water quality standards.
- **Groundwater Recharge.** Active recharge of imported water or captured runoff could cause movement of one of the constituents of concern towards a supply well in concentrations that exceed relevant water quality standards.
- **Recharge of Poor-Quality Water.** Recharging the Subbasin with water that exceeds a primary or secondary MCL or concentration that reduces crop production will lead to an undesirable result.

8.7.4.3 Effects on Beneficial Users and Land Use

The practical effect of the degraded groundwater quality undesirable result is that it deters any significant changes to groundwater quality. Therefore, the undesirable result will not impact the use of groundwater and will not have a negative effect on the beneficial users and uses of groundwater.

8.8 Land Subsidence Sustainable Management Criteria

8.8.1 Locally Defined Significant and Unreasonable Conditions

Locally defined significant and unreasonable conditions for land subsidence were assessed based on public meetings and discussions with GSA staff. Significant and unreasonable rates of land subsidence in the Subbasin are those that lead to a permanent subsidence of land surface elevations that impact infrastructure. For clarity, this Sustainable Management Criterion adopts two related concepts:

- **Land Subsidence** is a gradual settling of the land surface caused by compaction of subsurface materials due to lowering of groundwater elevations from groundwater pumping. Land subsidence in an inelastic process, and the decline in land surface is permanent.
- **Land Surface Fluctuation** is the periodic or annual measurement of the ground surface elevation. Land surface may rise or fall in any one year. Declining land surface fluctuation may or may not indicate long-term permanent subsidence.

8.8.2 Minimum Thresholds

Section 354.28(c)(5) of the SGMA regulations states that "*The minimum threshold for land subsidence shall be the rate and extent of subsidence that substantially interferes with surface land uses and may lead to undesirable results.*"

8.8.2.1 Information Used and Methodology for Establishing Subsidence Minimum Thresholds

The information used for establishing the land subsidence minimum thresholds included:

- Historical land surface elevation data from continuous GSP locations in the Subbasin
- Feedback about significant and unreasonable conditions gathered from GSA staff members and stakeholders

Land surface elevation is measured by the University NAVSTAR Consortium (UNAVCO) at five continuous global positioning system (GPS) sites in and around the Subbasin (Figure 7-5). Minimum thresholds for subsidence are set at these five locations. The basis for the subsidence minimum threshold is zero long term subsidence. The five GPS sites in the monitoring network have displayed multi-year land surface fluctuations, but generally do not display a long-term decline in land elevation that indicate subsidence is occurring in the Subbasin. The historical land surface fluctuations at these five sites demonstrate that a decline in land surface observed in one year may be compensated for by a similar rise in land surface the following year.

Discussions with GSA staff and the public indicated that, while people were generally in agreement with the goal of zero subsidence, there was concern about being held accountable for small amounts of subsidence that would not harm infrastructure.

Rate of Subsidence. Any rate of subsidence, if maintained over a long period of time, could lead to significant and unreasonable conditions. Therefore, the acceptable rate of subsidence is zero at all five continuous GPS sites. However, there may be annual land surface fluctuations that are acceptable because they would not be expected to indicate long-term subsidence.

As shown on Figure 7-6, most of the continuous GPS stations show some years with an annual rise in land surface elevation. This rise is often part of a longer-term trend, and does not appear to be related to seasonal elastic subsidence. The maximum measured rate of rise for each of the five continuous GPS sites is tabulated in Table 8-10.

Table 8-10. Maximum Measured Rate of Ground Surface Rise

Continuous GPS Site	Maximum Annual Rise (inches)	Maximum Annual Rise (feet)	Time Period
Hillm Ranch CS2005	0.51	0.04	June 2010 to June 2011
Ranchita Cn CS2006	0.43	0.04	May 2017 to May 2018
CRBT SCGN CN2001	0.42	0.04	August 2017 to August 2018
Hog Canyon CS2007	0.50	0.04	May 2017 to May 2018
Camatta Cyn CS2006	0.90	0.04	June 2010 to June 2011

The values in Table 8-10 are used to determine acceptable rates of measured land surface decline that could result in zero long-term subsidence. For example, if 0.5 inch of land surface drop is measured during a year at site P-531, Table 8-10 shows that this site has a capacity for, and demonstrated history of, rising 0.5 inch in a subsequent year, yielding a net zero subsidence rate. Therefore, minimum thresholds are set to the maximum observed annual land surface rise in ground surface at each continuous GPS site.

Extent of Subsidence. Because it is difficult to identify areas of the Subbasin where permanent subsidence has no impact on infrastructure, subsidence in any portion of the Subbasin is significant and unreasonable. Therefore, minimum thresholds are set for all five of the existing continuous GPS sites.

8.8.2.2 Land Subsidence Minimum Thresholds

Based on an analysis of historical land elevation fluctuations at these five sites, the minimum thresholds for annual land surface fluctuation at the five continuous GPS sites are shown in Table 8-11.

Table 8-11. Subsidence Minimum Thresholds

Continuous GPS Site	Rate of Land Surface Decline (inches per year)
Hillm Ranch CS2005	0.51
Ranchita Cn CS2006	0.43
CRBT SCGN CN2001	0.42
Hog Canyon CS2007	0.50
Camatta Cyn CS2006	0.90

8.8.2.3 Relationship between Individual Minimum Thresholds and Relationship to Other Sustainability Indicators

The subsidence minimum thresholds are derived from measurements at individual continuous GPS sites. Therefore, the minimum thresholds are unique at every GPS site, but together they represent a reasonable and realistic rate of simultaneous land surface movement across the Subbasin. Because the underlying data are reasonably achievable simultaneously, the different minimum thresholds at the GPS sites do not conflict with each other.

The subsidence minimum thresholds have little or no impact on other minimum thresholds, as described below.

- **Chronic lowering of groundwater elevations.** Maintaining groundwater levels to avoid subsidence will not result in a significant or unreasonable lowering of groundwater levels.
- **Change in groundwater storage**. The subsidence minimum thresholds will not change the amount of pumping, and will not result in a significant or unreasonable change in groundwater storage.

- **Seawater intrusion**. This sustainability indicator is not applicable to this Subbasin
- **Degraded water quality**. The subsidence minimum thresholds will not change the groundwater flow directions or rates, and therefore and will not result in a significant or unreasonable change in groundwater quality.
- **Depletion of interconnected surface waters.** The ground level subsidence minimum thresholds will not change groundwater levels near streams and will not result in a significant or unreasonable depletion of interconnected surface waters.

8.8.2.4 Effect of Minimum Thresholds on Neighboring Basins

The anticipated effect of the subsidence minimum thresholds on each of the two neighboring subbasins is addressed below.

- **Upper Valley Subbasin of the Salinas Valley Basin**. The ground surface subsidence minimum thresholds are set to prevent any long-term subsidence that could harm infrastructure. Therefore, the subsidence minimum thresholds will not prevent the Upper Valley Subbasin from achieving sustainability.
- **Atascadero Subbasin**. The subsidence minimum thresholds are set to prevent any long-term subsidence that could harm infrastructure. Therefore, the subsidence minimum thresholds will not prevent the Atascadero Subbasin from achieving sustainability.

8.8.2.5 Effects on Beneficial Uses and Users

The subsidence minimum thresholds are set to prevent subsidence that could harm infrastructure. Available data indicate that there is currently no subsidence occurring in the Subbasin that affects infrastructure, and reductions in pumping are already required by the reduction in groundwater storage sustainability indicator. Therefore, the subsidence minimum thresholds do not require any additional reductions in pumping and there is no negative impact on any beneficial user.

8.8.2.6 Relation to State, Federal, or Local Standards

There are no federal, state, or local regulations related to subsidence.

8.8.2.7 Method for Quantitative Measurement of Minimum Threshold

Continues GPS data from the five identified sites will be downloaded annually from the UNAVSCO internet site. Daily GPS data will be converted to average monthly data and plotted on graphs similar to those shown on Figure 7-6. Both quantitative and qualitative assessments of the data will be performed to assess if any trends are apparent, and if the annual subsidence is greater than the minimum thresholds.

8.8.3 Measurable Objectives

The measurable objectives for subsidence represent target subsidence rates in the Subbasin.

8.8.3.1 Method for Setting Measurable Objectives

The measurable objectives were set to the land surface declines that result in zero long-term subsidence. As discussed in Section 8.8.2, some annual land surface elevation fluctuation is measured at the five GPS sites, but these annual fluctuations do not translate into long-term subsidence. Therefore, some annual land surface elevation fluctuation is allowable as long as it is not part of long-term subsidence.

8.8.3.2 Measurable Objectives

Because the minimum thresholds of zero subsidence are the best achievable outcome, the measurable objectives were set to the minimum thresholds. Based on the existing monitoring system, the subsidence measurable objectives are shown in Table 8-12.

Table 8-12. Subsidence Measurable Objectives

Continuous GPS Site	Rate of Land Surface Decline (inches per year)
Hillm Ranch CS2005	0.51
Ranchita Cn CS2006	0.43
CRBT SCGN CN2001	0.42
Hog Canyon CS2007	0.50
Camatta Cyn CS2006	0.90

8.8.3.3 Interim Milestones

Interim milestones show how the GSAs anticipate moving from current conditions to meeting the measurable objectives. Interim milestones are set for each five-year interval following GSP adoption.

Subsidence measurable objectives are set equal to minimum thresholds, which reflect the current condition, of no subsidence. The interim milestones for each of the six minimum thresholds are shown in Table 8-13. Interim milestones are long-term subsidence rates, not the annual measured land surface fluctuation rates. Therefore, the interim milestones are not numerically equivalent to the minimum thresholds and measurable objectives.

Table 8-13. Subsidence Interim Milestones

Continuous GPS Site	5-Year Long-Term Subsidence Rate (inches per year)	10-Year Long-Term Subsidence Rate (inches per year)	15-Year Long-Term Subsidence Rate (inches per year)
Hillm Ranch CS2005	0	0	0
Ranchita Cn CS2006	0	0	0
CRBT SCGN CN2001	0	0	0
Hog Canyon CS2007	0	0	0
Camatta Cyn CS2006	0	0	0

8.8.4 Undesirable Results

8.8.4.1 Criteria for Defining Undesirable Results

The SGMA regulations state that the subsidence undesirable result is a quantitative combination of subsidence minimum threshold exceedances. For the Subbasin, significant subsidence that impacts infrastructure is unacceptable. However, available continuous GPS data show annual land surface fluctuations that do not necessarily indicate long-term subsidence is occurring. Future GPS data could suggest that subsidence is occurring when annual ground level declines are part of a long-term trend. To address the inherent data uncertainty, one minimum threshold exceedance is allowed each year. Therefore, the subsidence undesirable result is:

During any one year, only one subsidence minimum threshold shall be exceeded. An Individual continuous GPS sites may not exceed its minimum threshold for more than two consecutive years.

8.8.4.2 Potential Causes of Undesirable Results

Conditions that may lead to an undesirable result include a shift in pumping locations, which could lead to a substantial decline in groundwater levels. Shifting a significant amount of pumping and causing groundwater levels to fall in an area that is susceptible to subsidence could trigger subsidence in excess of the minimum thresholds.

8.8.4.3 Effects on Beneficial Users and Land Use

The undesirable result for subsidence allows one exceedance of a minimum threshold to account for measurement error and uncertainty. If the exceedance is due to actual subsidence and not measurement error, then localized subsidence could impact beneficial users by impacting infrastructure.

8.9 Depletion of Interconnected Surface Water SMC

8.9.1 Locally Defined Significant and Unreasonable Conditions

As described in Chapter 4, Hydrogeologic Conceptual Model and Chapter 5, Groundwater Conditions, the prevailing belief of local residents and experts in the Subbasin based on observation and some hydrologic data, is that interconnected surface water and groundwater does not currently exist in the Subbasin. As described in Chapter 7, Monitoring Networks, a more expansive monitoring network will be developed during GSP implementation to improve understanding of interconnection between surface water and groundwater in the Subbasin. If in the future, data indicate that surface water and groundwater are interconnected, locally defined significant and unreasonable conditions will be assessed for those interconnected areas.

8.9.2 Minimum Thresholds

Section 354.28(c)(6) of the SGMA regulations states that "*The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results*."

Surface water and groundwater in the Subbasin do not appear to be interconnected at this time. Therefore, minimum thresholds were not developed for the GSP. If in the future, data from a more comprehensive monitoring program indicate that surface water and groundwater are interconnected, minimum thresholds will be developed for areas of interconnection. Since minimum thresholds were not developed for the GSP, information about the methods used to develop minimum thresholds, the quantitative metrics to track compliance with minimum thresholds, and their impact on other sustainability indicators, other Subbasins, and beneficial use and users of groundwater is not presented in this section like it was for the other sustainability indicators.

8.9.3 Measurable Objectives

Similar to minimum thresholds, measurable objectives were not developed for the GSP. If in the future, data from a more comprehensive monitoring program indicate that surface water and groundwater are interconnected, measurable objectives will be developed for areas of interconnection. Since measureable objectives were not developed for the GSP, information about the methods used to develop measurable objectives and interim milestones is not presented in this section like it was for the other sustainability indicators.

8.9.4 Undesirable Results

Because there does not appear to be an interconnection between surface water and groundwater in the Subbasin at this time, undesirable results, including impacts to beneficial uses and users of groundwater, related to interconnected surface water and groundwater are not expected to occur. If in the future, data from a more comprehensive monitoring program indicate that surface water and groundwater are interconnected, undesirable results related to interconnected surface water and groundwater will be assessed.

8.10 Management Areas

Management areas have not been established in the Subbasin. For planning purposes, the concepts for future management areas are provided below.

8.10.1 Future Management Area Concept

Management areas may be developed in the future based on the existence of a geologic and geographic divide in the Subbasin. The Subbasin is dominated by two main watersheds and many smaller watersheds that drain into and recharge the Subbasin. The western portion of the Subbasin is fed by the Salinas watershed, including the Huer Huero watershed. The eastern portion of the Subbasin is fed by the Estrella River watershed, including Cholame Creek and San Juan Creek watersheds. These two watersheds have different geologic and climatic conditions. Both watersheds drain to the confluence of the Estrella and Salinas Rivers near San Miguel in the northern end of the Subbasin. A distinct geologic ridge divides the Huer Huero portion of the Salinas River watershed from the Shed Canyon portion of the Estrella River watershed. This uplifted ridge bisects the Subbasin and the Estrella River cuts through this ridge near Whitley Gardens. The Subbasin may be divided into western and eastern management areas along the uplifted ridge in the future.

The nature of this divide and the underlying geology within the Subbasin needs to be better understood before the GSAs can delineate and justify any management area. The GSAs will initiate and support electromagnetic resonance surveys to help delineate local geology. Reports from well owners throughout the Subbasin suggest that some areas of the Subbasin are distinctly isolated from neighboring areas. Analysis of static groundwater levels from as many wells as possible will help to define areas where groundwater conditions appear to be hydrologically connected and areas where these conditions seem to be hydrologically isolated. This will help form the basis of defining the management area. This effort will also assist in defining where future monitoring wells should be located. The GSAs in the proposed management areas may undertake distinct management approaches which would be appropriately designed to protect the local groundwater resource without adversely impacting other areas of the Subbasin or neighboring Subbasins.

Each area of the Subbasin will be managed in conjunction with all other areas using the same set of undesirable results and minimum thresholds, tied to specific RMSs as described in this chapter. The Subbasin wide monitoring networks will be used to assure compliance with the GSP. Using management areas to assure long-term sustainability protects all beneficial uses and users in all parts of the Subbasin.

8.10.2 Minimum Thresholds and Measurable Objectives

The minimum thresholds that will be established in potential management areas will use the same process and criteria described above in this chapter. The minimum thresholds and measurable objectives will be developed to ensure groundwater levels remain above historical water levels in each management area, and to maintain historical groundwater flow conditions to downstream portions of the Subbasin and other downstream basins. By managing groundwater sustainably in each management area, the groundwater resource remains available for beneficial uses and users. Groundwater quality will not be degraded due to poor quality water moving into productive aquifers.

8.10.3 Monitoring

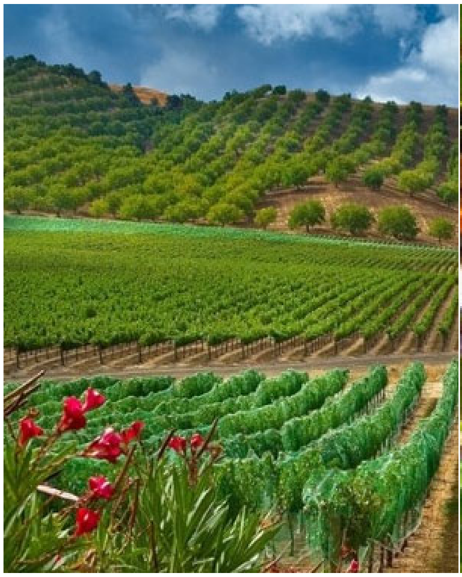
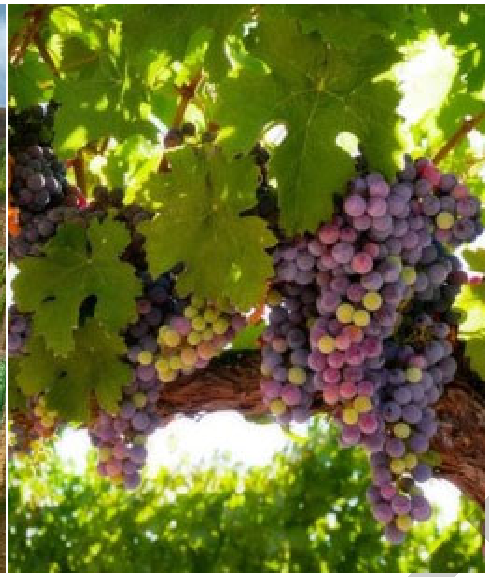
Because of the large size and distinctly separate drainages of the watersheds draining into each of management area, there is a need for a robust network of monitoring wells that provide data representative of specific portions of each management area. Initially, existing wells with known depths and known perforated intervals will be selected and used. Where needed dedicated new monitoring wells may be added to improve the monitoring network.

8.10.4 How Management Areas Will Avoid Undesirable Results

The undesirable results described in the sections above are applicable in each management area. As long as minimum thresholds and measurable objectives continue to be met within each management area, beneficial uses and users of the groundwater resource will be assured of continued access to a sustainable groundwater resource. The projects and management actions in each management area will be proportional to the need to maintain those minimum thresholds and measurable objectives.

8.10.5 Management

The establishment and implementation of Management Areas would follow the agreement among the four GSAs (see GSP Chapter 12).



DRAFT MANAGEMENT ACTIONS AND PROJECTS FACT SHEET

Paso Robles Subbasin GSP Development

__Disclaimer__ These Draft Documents are provided for information only and are intended to help facilitate discussions related to Projects & Management Actions to be considered in the Paso Basin Groundwater Sustainability Plan (GSP), currently under development. The information contained herein is subject to change and does not commit, nor does it necessarily reflect the views, opinions or endorsement of, the Cooperative Committee or any Agency.

PURPOSE

This fact sheet provides an overview of the potential management actions and projects that are being considered for the Paso Robles Subbasin Groundwater Sustainability Plan (GSP). These management actions and projects will be implemented to sustainably manage groundwater resources in the Subbasin.

The Sustainable Groundwater Management Act (SGMA) requires the GSP to demonstrate how the proposed management actions and projects will lead to sustainability. The concepts presented herein are not final. The intent of the fact sheet is to prompt discussion and feedback from the Groundwater Sustainability Agencies (GSAs) and stakeholders on acceptable management actions and projects that will lead to sustainable groundwater conditions in the Subbasin and will maintain the social and economic vitality of the region.

A combination of management actions and projects adopted for the Subbasin will achieve a number of outcomes including:

- Achieving groundwater sustainability by meeting Subbasin-specific sustainable management criteria. These criteria must be achieved for each relevant sustainability indicator by 2040.
- Providing equity between who benefits from projects and who pays for projects.
- Providing a source of funding for project implementation (not operational costs).
- Providing incentives to constrain groundwater pumping within limits. Unregulated pumping in the future would require importation of new water supplies that are likely unavailable.

OVERVIEW

The approach for implementing management actions and projects will provide individual landowners and public entities flexibility in how they manage water and how Subbasin achieves groundwater sustainability. All groundwater pumpers will be allowed to make individual decisions on how much groundwater they pump based on their perceived best interests. Some groundwater pumpers may choose to reduce pumping; others may choose to buy water from neighbors or retire land, while others may choose to pay for new water supply projects.

The proposed approach for implementing management actions and projects is based on a **water charges framework.** This framework is designed to achieve two important outcomes:

1. Promote voluntary pumping reductions; and
2. Fund new water supply projects by charging groundwater pumpers a fee if they choose to not voluntarily reduce pumping.

This conceptual water charges framework would include:

- Quantifying pumping allowances for every groundwater pumper. **These allowances are not water rights.** Instead, they form the basis of a financial rate structure to fund new water supply projects.
- Developing a tiered rate structure for pumping groundwater. Groundwater pumped within a pumping allowance would be charged a base rate. Groundwater pumped above a pumping allowance would incur a higher cost (surcharge).
- Using base rate funds to plan, design, and permit one or more of the management actions or projects described below.
- Using surcharge funds to purchase and treat water, and bring it into the Subbasin.

Alternate approach to the framework outlined above could be implemented. One alternate approach would be to first develop new water supply projects. In this case, all pumpers would pay a surcharge and the GSAs would immediately begin developing projects and brining in water to the Subbasin. Pumpers would pay a smaller surcharge or possibly no surcharge if they decided to voluntarily reduce pumping. This has the same net effect as the proposed structure, except the initial focus would be on building new water supply projects instead of promoting voluntary pumping reductions.

In considering a water charges framework, some new water supply projects may be so important or desirable that they would be implemented outside of the proposed fee structure. For example, obtaining State Water Project water could be initiated outside of the water charges framework and could be funded by a general fund developed by the GSAs.

WATER CHARGES FRAMEWORK

Water Charges

Base Pumping Assessment
Fee per acre-foot charged for all non-exempt pumping.

Overproduction Surcharge
Additional fee per acre-foot charged for any non-exempt pumping above the Production Allowance.

The water charges framework is the fundamental structure for managing groundwater pumping and funding projects. The framework includes developing pumping allowances, ramping down pumping to an allowable limit, developing and implementing a fee payment program, and funding projects.

The GSP will not impose mandatory pumping restrictions. Instead, the framework promotes voluntary pumping reductions that may be achieved in a variety of ways. For example, a pumper may choose to switch to less water-intensive crops, implement water use efficiencies, or transition to non-groundwater sources. Alternatively, if reducing pumping is not of interest or acceptable, a pumper may instead pay an overproduction surcharge. *De minimis* pumpers, defined as domestic groundwater pumpers using up to 2 acre-feet per year, would be exempted from water charges.

Funds from the water charges program would be used by the GSAs to develop new water supplies, as described below. Revenues could also fund incentive-based programs to reduce water demand - for example, agricultural land acquisition and retirement. Under the framework, there would be two categories of water charges: base pumping assessments and overpumping surcharges (defined in the callout box). Revenues from the pumping assessments would fund the fixed costs associated with new water projects that benefit all pumpers. Revenues from the overpumping surcharge would fund the variable costs associated with new water projects as the water is used to offset or replace overproduction.

PUMPING ALLOWANCES

Pumping allowances are not water rights and do not limit pumping. Pumping allowances would be established only to enable calculation of overpumping surcharges. The proposed process for establishing initial pumping allowances is as follows:

- **Agricultural Pumpers**: Initial pumping allowances are established for agricultural pumpers based on average cropped acreage for the years 2010 through 2015. The assumed amount of pumping per acres is consistent with water use factors established in San Luis Obispo County's existing Agriculture Offset Program.
- **Municipal & Industrial (M&I) Pumpers**: Initial pumping allowances are assigned according to actual pumping amounts (estimated or measured).
- ***De minimis* Pumpers**: Exempt.

RAMP DOWN

Pumping allowances will be ramped down in areas where overdraft exists. The ramp down will occur over a number of years to ensure pumping is within the Subbasin's sustainable yield. A number of ramp down options are available. We propose that pumping be reduced in specific areas of the basin where overdraft exists according to copping patterns and historically observed changes in groundwater elevations. Different water rights holders will be subject to different ramp downs:

- Surface water rights holders are not subject to this ramp down
- Pumping of any water owned and recharged by and individual or entity is not subject to ramp down

- Overlying water rights holders and quantified prescriptive rights holders are subject to equal ramp downs within a geographic area
- Appropriative rights holders are subject to a greater ramp down than the overlying water rights holders in the same geographic area.

Such adjustments would be timed to meet the interim milestones set forth in the GSP. Other options may also be appropriate and would be developed by the GSAs.

CARRYOVER

Groundwater pumping can fluctuate from year-to-year depending on weather conditions, particularly for agricultural pumpers. To provide pumpers the flexibility to pump more during dry years and less during wet years, the unused portion of a Pumping Allowance for a given year may be carried over for use in subsequent years. For example, an agricultural pumper with 10 acre-feet (AF) of Pumping Allowance who only pumps 5 AF this year would be able to pump 15 AF next year (10 AF of annual Production Allowance plus 5 AF of carryover) without incurring an overproduction surcharge. The amount a pumper can carryover would be limited. For example, one approach might be to limit each pumper's individual carryover amount to an amount equal to that pumper's pumping allowance. Additionally, carryover is discounted over time. Every year, a pumper loses a percentage of their carryover.

RE-LOCATION AND TRANSFER OF PUMPING ALLOWANCES

Pumping allowances may be moved between properties temporarily or permanently. For example, an agricultural pumper could voluntarily fallow marginal farmland, and move the pumping allowance to highly productive farmland to expand irrigation on the better land. Such re-location of pumping allowances would be subject to review by GSAs to ensure that sustainability goals are being met. GSAs will model the re-location using the GSP model to assess any significant and unreasonable impacts from the proposed relocation. Re-locating pumping allowances provides pumpers with flexibility, and maintains consistency with San Luis Obispo County's current Agriculture Offset Program. Pumping allowances could also be permanently or temporarily sold between water users, and could be used for another pumping purpose. For example, agriculture use to M&I use, subject to pumping amount adjustments for changes in consumptive use.

ADMINISTRATION, ACCOUNTING, AND MANAGEMENT

The GSAs would administer the water charges program. Administrative duties would include developing initial pumping allowances, tracking pumping allowance ownership, accounting for water use, calculating, assessing, and collecting fees, and reviewing proposed re-location of pumping allowances. GSAs would use Water Charges revenues to fund projects that develop new water supplies for the benefit of the Subbasin.

The total amount of groundwater pumped by each land owner or entity will be measured in a number of ways:

- Municipal groundwater users and small water systems report their measured groundwater usage to the SWRCB Division of Drinking Water. These data are available on the State's Drinking Water Information Clearinghouse website ("Drinking Water Information Clearinghouse"). These data will be used to quantify municipal and small water system pumping.
- Agricultural pumping will be collected in two ways:
    - Agricultural pumpers may report metered pumping directly to their GSA.
    - Pumping will be estimated by the GSA for agricultural pumpers that do not report their pumping. The annual pumping will be estimated using the County of San Luis Obispo's crop data and crop duty estimates, times a multiplier. For example, if the crop duty for wine grapes is 1.2 acre-feet/year, using a multiplier of 1.5 means a grower is assessed 1.8 acre-feet of water (1.2 time 1.5) for every acre of unreported wine grape pumping.

MANAGEMENT ACTIONS

Management actions are new or revised programs or policies that are intended to improve local groundwater use. Several potential management actions are being considered by the GSAs, including urban conservation, agricultural conservation, and land use restrictions. Management actions can be implemented by individual landowners or by GSAs.

A combination of management actions will be required to achieve sustainability and avoid adversely impacting the local economy. Some management actions may work for one pumper, while others may work for a different pumper. the water charges framework provides a flexible structure that allows each pumper to select their preferred management actions.

POTENTIAL MANAGEMENT ACTIONS


Urban conservation


Agricultural conservation/efficiency


Land use restrictions


Mandatory pumping restrictions

One example of management actions that could be undertaken by GSAs is agricultural land retirement. Water charges revenues may be used by a GSA to acquire and retire irrigated land to reduce pumping. In some areas of the Paso Robles Subbasin where groundwater levels are declining, delivering non-groundwater sources to offset pumping is infeasible because of high cost and/or technical limitations. Irrigated land purchased by a GSA would be done on a voluntary basis from willing sellers at negotiated market prices. GSAs would cease irrigation on acquired land to reduce pumping. GSAs would coordinate with other local agencies and stakeholders to determine beneficial uses of the acquired land.

WATER SUPPLY PROJECTS

Funds raised from the water charges framework could be used to develop projects that enhance groundwater recharge either directly or through in-lieu methods. There are five potential new water sources available to the Paso Robles Subbasin, and three methods of distributing and using these new water supplies. Available water supplies, procurement options, and considerations are summarized in Table 1.

AVAILABLE WATER SUPPLIES

- State Water Project
- Nacimiento Water Project
- Recycled Water
- Diversion of Local Rivers/Streams
- Expansion of Salinas Dam

AVAILABLE WATER SUPPLIES

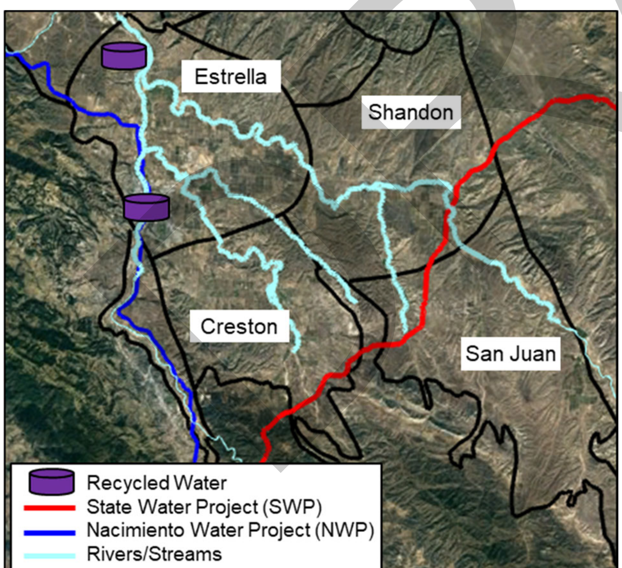


Figure 1. Available Water Supplies

State Water Project (SWP) – Treated SWP water is conveyed through the southeastern portion of the Subbasin via the Coastal Branch Aqueduct. San Luis Obispo County Flood Control and Water Conservation District (the District) currently has a SWP allocation of 25,000 AFY, of which about 14,500 AFY is unused "excess" allocation. SWP could be purchased either through a long-term agreement with an existing subcontractor, or by becoming a new SWP subcontractor under the District. Under the latter approach, one of the GSAs – likely the County – will become a subcontractor.

Historically, DWR delivers about 58% of allocated supplies. Multiplying 58% by the unused excess amount of 14,500 acre-feet per year yields an average annual supply of 8,900 acre-feet per year that may be available for use in the Subbasin. Actual availability would be less in dry years and more in wet years. Developing

SWP supplies for use in the Subbasin will require negotiation of contracts, engineering studies, and environmental permits. Because these activities are time-consuming, the GSAs will recommend in the GSP to initiate work on developing SWP water shortly after adoption of the GSP. This includes immediate negotiations on acquiring the use and rights to the district as excess allocation

Nacimiento Water Project (NWP) – Raw water from Nacimiento Reservoir is currently conveyed through the NWP pipeline to five contractors in the region. To use NWP water to achieve sustainability, GSAs could contract with and purchase water from an existing contractor or through a turnback pool among all existing contractors. The NWP water is fully allocated, although surplus supplies exist because subcontractors are not using their full allocation. The current average annual surplus supply is about 8,600 AFY; this amount is projected to decrease to about 5,700 AFY in 2040. The NWP contractors are currently developing a formalized water marketing program to trade and sell unused allocation. This formalized program may simplify the GSAs ability to obtain NWP water. The GSAs will recommend in the GSP that negotiation of long-term contracts with existing contractors begin shortly after approval of the GSP.

Recycled Water (RW) – RW projects are already being planned by both the San Miguel Community Services District (San Miguel) and the City of Paso Robles. San Miguel plans to reuse 200 AFY. The City of Paso Robles expects to reuse between 2,900 and 5,000 AFY. A total of about 2,600 AFY of recycled water are assumed available as new supply.

Local Rivers/Streams – Excess surface water from Salinas River, Estrella River, and/or Huer Huero Creek could be used to achieve sustainability. To do this, GSAs could apply for either a standard diversion permit or possibly a new temporary flood flows permit (currently being developed by the State Water Resources Control Board). Standard diversion permits are challenging to obtain, subject to protest by existing users, and would only allow for diversion during spring months due to existing water rights. Temporary flood flow permits are anticipated to be easier to obtain; however, substantial high cost infrastructure would be required to make use of rare winter high flood flow events. Due to these challenges, diverting and using local surface water as a new supply will be included in the GSP as a potential back-up project.

Localized recharge of rainfall runoff before it enters a stream or river is also possible. This type of program is currently being implemented in Pajaro Valley. While this is a simpler project to implement, the amount of water realized from these types of programs is generally small. However, the GSAs should develop a program to promote local, on farm recharge of runoff. The program could include reductions in the water charges framework surcharge cost for every acre-foot of water recharged.

Expansion of Salinas Dam – Expansion of the Salinas Dam on Lake Santa Margarita is being investigated by the County. The transfer of ownership, benefits of expansion, and funding options are yet to be determined. Expansion of Salinas Dam to derive new water supplies for the Subbasin will be included in the GSP as a potential back-up project.

Table 1: Summary of Available Supplies in the Paso Robles Subbasin

Source	Procurement Options	Important Considerations
SWP	• Become new SWP subcontractor under the District • Negotiate contract with an existing subcontractor	Less water available during dry years. Water available during growing season
NWP	• Long-term purchase agreement from existing contractor • Turnback pool among existing contractors	Potential water quality issues
RW	• City of Paso Robles planned project underway • City of San Miguel planned project underway	Requires blending with other water to reduce salt loading
Local Rivers & Streams	• Standard diversion permit • Anticipated temporary flood flows permitting process	Permits are uncertain
Salinas Dam Expansion	County is in the process of investigating transfer of ownership, benefits of expansion, and funding options	Legal and timing concerns are currently unclear

Options to Deliver New Water Supplies

There are several options to deliver new water to the Subbasin, including:

Direct Delivery – A new non-groundwater supply could be delivered directly to irrigators to offset the use of groundwater. Direct delivery projects would require design, permitting and construction of pumping stations, pipelines, and storage facilities to convey the variable supply of new water to agricultural users. Direct delivery requires that the water be available during the growing season (i.e. summer and shoulder months) for immediate use or stored in on-site ponds.

Delivery Options

- Direct delivery (offset pumping)
- Recharge basins
- Direct injection

Recharge Basins – Recharge basins are artificial ponds that would be filled with available new water supplies. Water from the recharge basin slowly seeps into the groundwater system.

Recharge basins would be appropriately located to maximize the benefit of recharge to the underlying aquifers. Recharge basins can be used throughout the year. Water recharged into the groundwater basin through recharge ponds can flow to other parts of the basin, resulting in benefits to the Subbasin in areas away from the recharge ponds.

Direct Injection – Injection wells could be used to inject available new water supplies directly into the groundwater basin. Treated water (e.g., treated SWP water) could be injected directly; raw water would need to be treated before injection. Injection wells can be operated continuously throughout the year. Injection wells are typically more efficient at getting water to productive aquifers than recharge basins. Water injected into the groundwater basin through direct injection can flow to other parts of the basin, resulting in benefits to the Subbasin in areas away from the injection wells.

Development of Project Alternatives for GSP

For the GSP, projects alternatives were developed from combinations of available new water supplies and delivery options. Total planning-level costs were estimated for each alternative, including capital, operation and maintenance costs. Important assumptions used to develop project alternatives are shown in Table 2.

Table 2: Project Alternatives Assumptions

General Assumptions	• The Basin will be managed as a whole but projects will be needed in target areas to address local groundwater deficits. • The shortest pipelines with the smallest elevation gains were selected for conceptual evaluation of water delivery to target. • For direct delivery projects, pipeline alignments were selected to deliver water to the largest users closest to the water source.
SWP Assumptions	• SWP water is treated water and is therefore suitable for direct injection. • SWP pipeline is located in the southern portion of the basin; therefore, water injected near the SWP pipeline will benefit the whole basin by flowing north into the regions with lower water table elevations.
NWP Assumptions	• NWP water supply projects were selected to not conflict with the recycled water service area.
Other Supply Assumptions	• Expansion of Salinas Dam is being investigated and a disposition study for transfer to the District is underway. Timing and legal requirements remain unclear so is currently assumed to be a back-up project.

For the GSP, projects alternatives will be evaluated that include practical combinations of water supply and delivery options that could be implemented to deliver new water supplies to areas where pumping has depleted groundwater storage in the basin. Table 3 summaries estimated project costs, which would vary by water supply type, delivery option, area within the Subbasin, and cost of the water. Costs were not estimated for backup projects.

Table 3: Estimated Planning-Level Cost of Project Alternatives

Supply	Area	Delivery Option	Estimated Amount AFY	Cost ($/AF)[1]
SWP	Creston	Direct delivery for irrigation	4,000 – 9,000	$2,600 – 3,900/AF
		Recharge basins[1]	4,000 – 9,000	$1,300 – 2,600/AF
		Direct Injection	4,000 – 9,000	$1,800 – 3,100/AF
	Shandon	Direct delivery for irrigation	4,000 – 9,000	$2,400 – 3,700/AF
		Recharge basins[1]	4,000 – 9,000	$1,300 – 2,600/AF
	San Juan	Direct delivery for irrigation	4,000 – 9,000	$2,900 – 5,400/AF
NWP	Estrella	Direct delivery for irrigation	4,000 – 8,000	$2,200 – 3,200/AF
		Recharge basins[1]	4,000 – 8,000	$1,500/AF
RW	San Miguel	Direct delivery for irrigation	200	to be determined
	City of Paso Robles	Direct delivery for irrigation	2,900+	<$1,900/AF

Notes:
(1) Include cost to purchase raw water, capital and construction costs annualized over 30 years, and operations and maintenance costs. Costs do not include efficiency factors. For example, the cost ($/AF) for recharge basin projects appears lower than others; however, only a portion of recharge basin water will directly benefit the deeper aquifers.

Recommended Preliminary Project Alternatives and Costs

Table 4 summarizes preliminary project alternatives that were developed based on the following criteria: the cost per acre foot of water, the ability of recharged water to benefit the deep aquifers in the Paso Robles Formation that are overdrafted, the ability of the project to meet sustainable management criteria, capital costs, and project feasibility. Direct delivery and injection project types were prioritized above recharge basins since they have the highest recharge (or in-lieu recharge) efficiency.

Table 4: Preliminary Recommended Projects for GSP

Supply	Area	Delivery Option	Estimated Supply AFY
SWP	Creston	Direct injection	4,400
	Shandon	Direct injection	4,400
NWP	Estrella/Salinas Confluence	Direct delivery for irrigation	2,300
RW	Near Airport	Direct delivery for irrigation	2,425+
	San Miguel	Direct delivery for irrigation	200
		Total AFY:	**13,725+**

The candidate project alternatives are described briefly below.

Direct Injection of SWP Water

GSAs would negotiate an agreement to acquire excess SWP water from the District. This water supply could be up to about 8,900 AFY, although for planning purposes it was assumed that 4,400 AFY could be obtained. SWP water would be taken from the Coastal Branch pipeline at new or expanded turnouts in the Shandon and Creston areas. Because this water is treated, this water could be directly injected via wells with minimal pretreatment in the Creston and Shandon areas.

Direct Delivery of NWP Water

GSAs would negotiate agreements with existing NWP water contractors to secure long-term contract for NWP water. This water would be directly delivered via pipeline to growers near the confluence of the Estrella and Salinas River to offset a portion of their groundwater pumping in that area. Recharge basins to recharge the groundwater basin with NWP water are potential back-up project, although suitable locations for basins near the NWP pipeline would need to be identified and proven. Direct injection may also be feasible; however, this option would require some forms of pretreatment. Additional studies would be needed to evaluate the feasibility of recharge via basins and/or injection wells.

Recycled Water Use

The planned RW projects of the City and San Miguel will be included in the GSP because they would offset some groundwater pumping and contribute to reducing the future groundwater storage deficit. RW would be directly delivered to growers for irrigation to offset a portion of their groundwater pumping. These projects will be undertaken by the Cities and not by the GSAs.

OTHER CONSIDERATIONS

Not all areas of the Subbasin will have all options open to them. For example, the cost to bring new water supplies to the southern end of the San Juan area was found to be high; therefore, to meet sustainable management criteria in this area, management actions like pumping cutbacks, land retirement and/or conservation measures would need to be implemented.

POTENTIAL TOPICS OF DISCUSSION REGARDING PROJECTS AND MANAGEMENT ACTIONS

The projects and management actions fact sheet includes a number of assumptions and proposals that stakeholders, GSA board members, or others may want to modify, change, or eliminate. The list below includes assumptions and ideas that we have identified in the fact sheet that could be changed, and may be of interest to various stakeholders and constituents.

This list is not exhaustive; however, it does provide guidance for topics that GSAs may want to discuss with their constituents. Many of these topics could require extensive discussion and negotiation. We recommend that GSAs **__immediately__** begin discussing these topics (and others) with their constituents.

Remember that it will not be necessary to reach agreement on all of these topics prior to finalizing the GSP. Many details will remain be negotiated after the GSP is adopted. However, the GSP must demonstrate that the four GSAs have an agreed to path to sustainability. Therefore, we will likely want to set conceptual agreements on the following topics in our GSP, even if the details have yet to be worked out. Setting these conceptual agreements will furthermore give stakeholders and other constituents confidence that the final agreement will be within the bounds of their expectations.

Items that are included in the fact sheet that could be modified, and should be discussed with your boards of directors and stakeholders, include the following:

- Equity. Should heavy pumpers pay more for projects, or should projects be paid for by all (likely as a land-based tax)

- Should operational costs be included in the water charges framework, or are those separate? Example activities that will be covered by operational costs include:
    - Installing new monitoring wells
    - Negotiating details of the water charges framework
    - Video-logging existing wells that may be part of our monitoring system
    - Setting up and running groundwater extraction monitoring system for the water charges framework
        - Maintaining recent crop data
        - Developing a well registration system
        - Implementing a flowmeter calibration system
        - Collecting or developing semi-annual estimates of pumping

- Setting up a pumping allowance trading platform and system

- Should GSAs implement some projects outside of the water charges framework structure? Should we start bringing in State Water Project water outside of this financial structure? Should we fund this based on a flat fee per acre?

- Status of de-minimis pumpers
    - Do we monitor their pumping?
    - Do they pay the base fee?
    - Are they exempt from monitoring and paying any fee?
    - Do we cap the total number of de-minimis pumpers allowed before they start paying a base fee?
    - Are they a special class with a lower base fee?

- What are the options for calculating pumping allowances?
    - Use only 2015 crop acreage
    - Use a longer period than 2010 to 2015 for averaging
    - Use the maximum crop acreage (by water use) between 2010 and 2015
    - Use other standardized crop duties – not San Luis Obispo crop duties.

- What are the options for the pumping allowance ramp down?
    - Should we ramp down over five, seven, or 10 years?
    - How does the ramp down acknowledge various types of water rights? Do all water rights holders ramp down at the same rate, or do some water rights holders ramp down more quickly or more slowly than others?
    - Should ramp downs be equal across the Subbasin (not recommended).

- Carryover
    - How much should carryover be capped?

- Pumping Re-Location
    - Can pumping for one use be transferred to another use?

- State Water Project
    - Is the county the correct subcontractor?
    - How would the county be repaid by other GSAs?

Appendix A: Additional Well Logs Used to Supplement Cross Sections

*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:

Page 1 of 2

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)
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

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 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

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

*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

Page 2 of 2

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)

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 [signature] 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

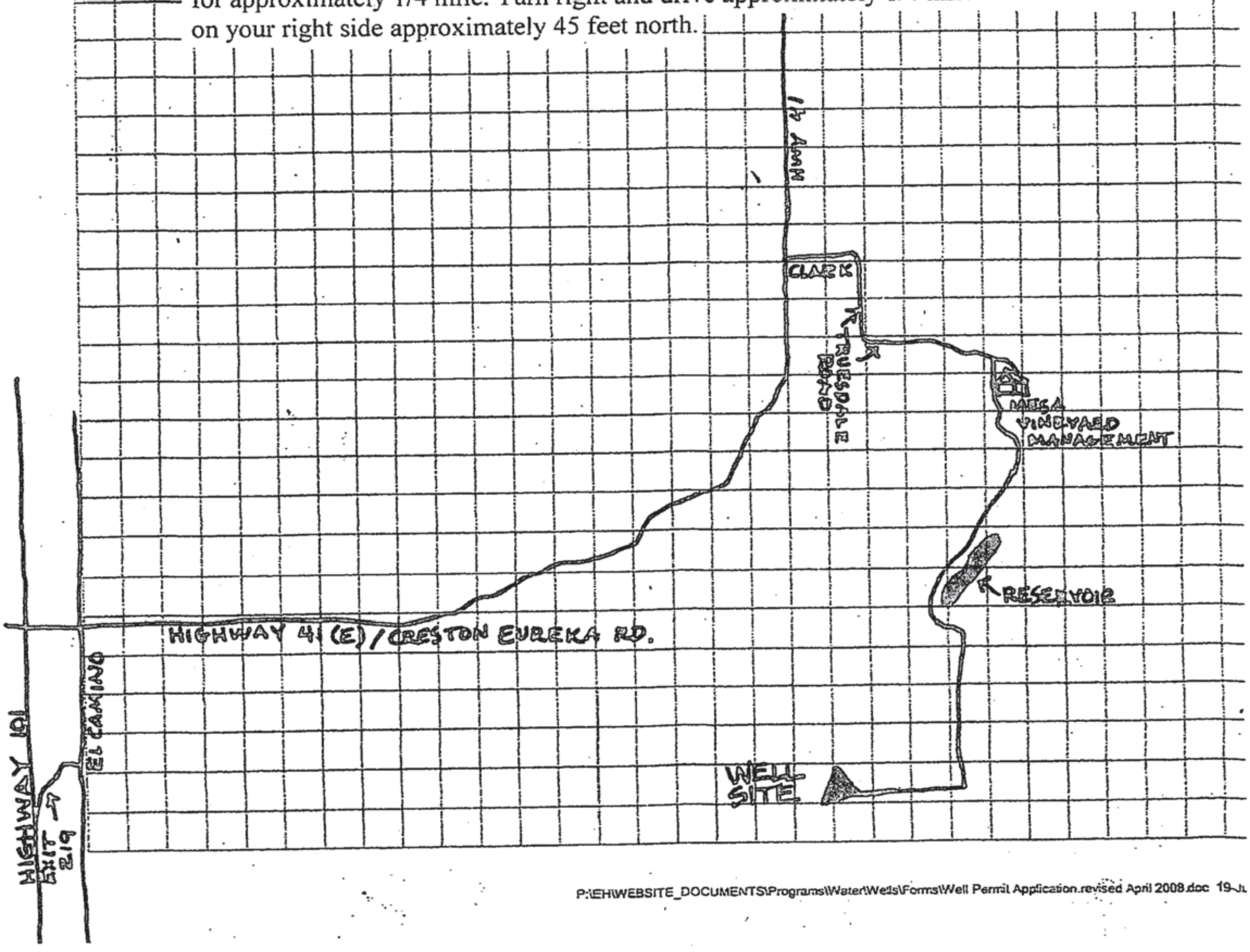
SAN LUIS OBISPO COUNTY ENVIRONMENTAL HEALTH SERVICES
2156 Sierra Way
San Luis Obispo, California 93401
Telephone: 805-781-5544

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 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.



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File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0188061

DWR Use Only – Do Not Fill In

State Well Number/Site Number

Latitude N Longitude W

APN/TRS/Other

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

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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File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0188061

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 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

e0188061

WELL PERMIT PLOT PLAN

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

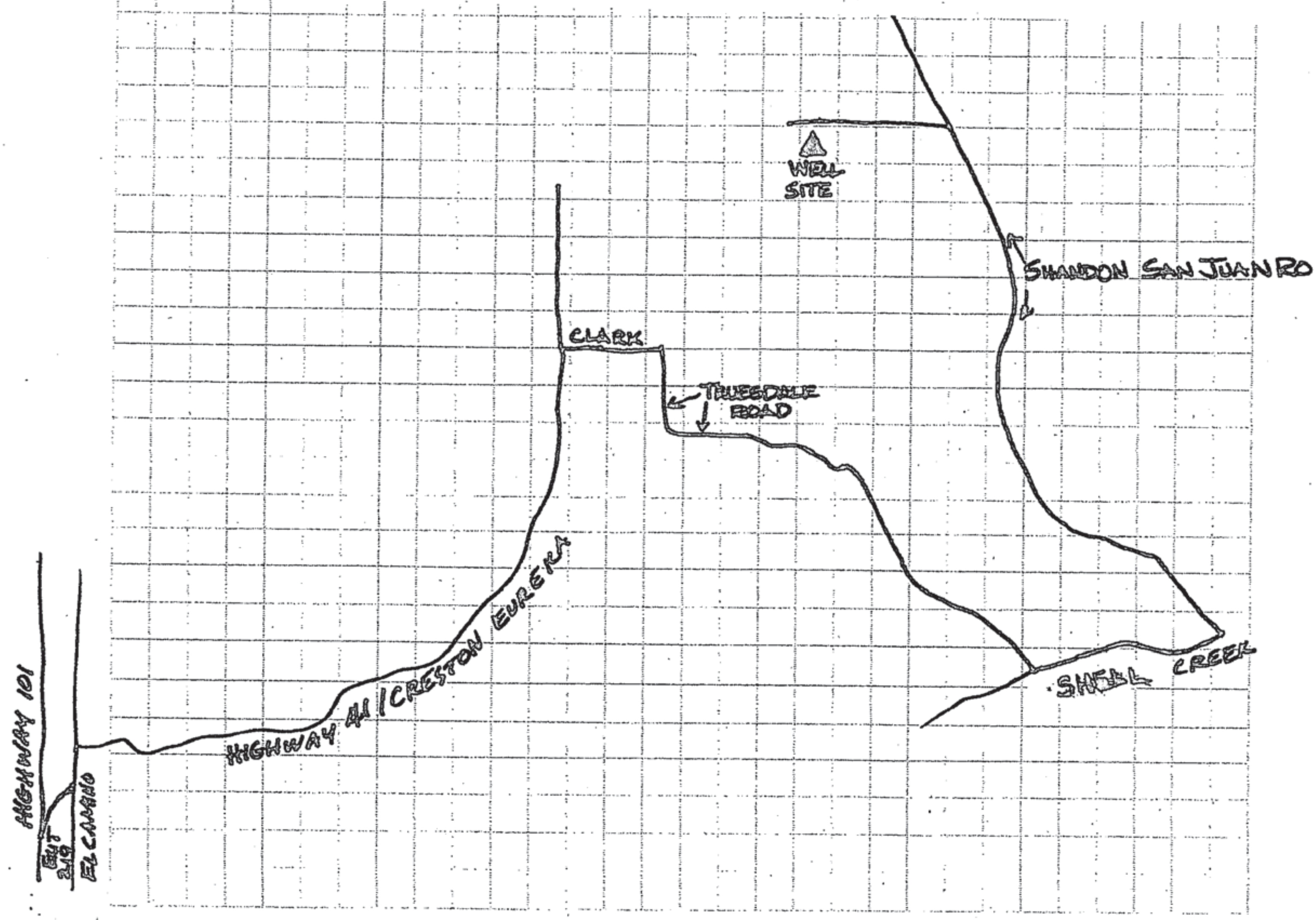
SCALE: ¼ inch = 25 feet

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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File Original with DWR

State of California
Well Completion Report
Refer to Instruction Pamphlet
No. e0162372

DWR Use Only – Do Not Fill In	
State Well Number/Site Number	
Latitude N	Longitude W
APN/TRS/Other	

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

Geologic Log

Orientation ⦿ Vertical O Horizontal O 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 / East / South

SEE ATTACHED

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
O Modification/Repair
 O Deepen
 O Other ____
O Destroy
Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

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

RECEIVED
DEC 5 2012

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File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0162372

Page 2 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 W

Latitude 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)
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

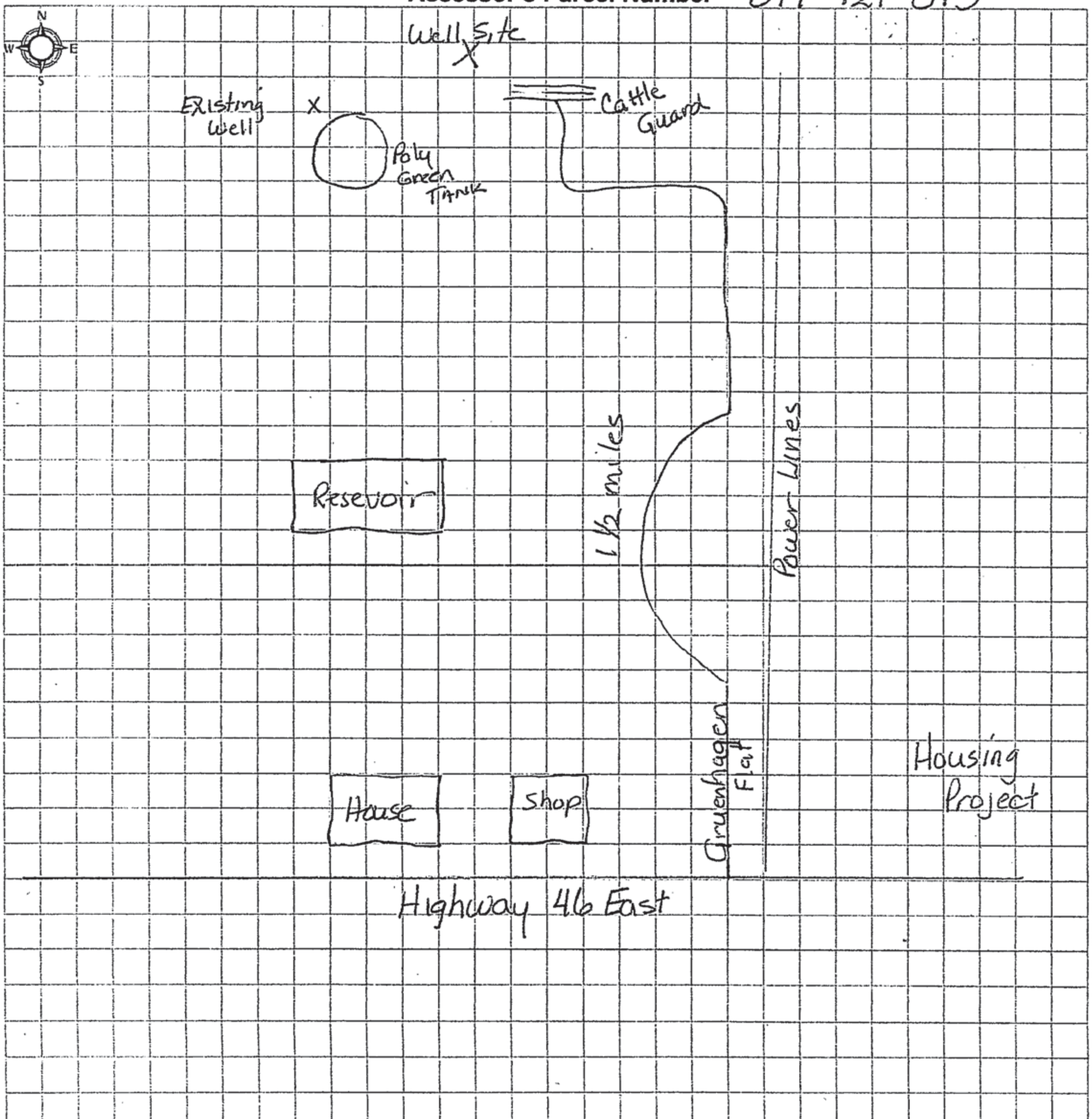
WELL PERMIT PLOT PLAN

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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File Original with DWR 25S12E07P

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)
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

*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. e0164974

DWR Use Only – Do Not Fill In

State Well Number/Site Number

Latitude N Longitude W

APN/TRS/Other

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

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 (Address) Templeton (City) CA (State) 93465-0184 (Zip)

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

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

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

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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

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OCT 29 2013

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

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File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0164974

Page 4 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)
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 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)
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

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Person, Firm or Corporation

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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

E0164974

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

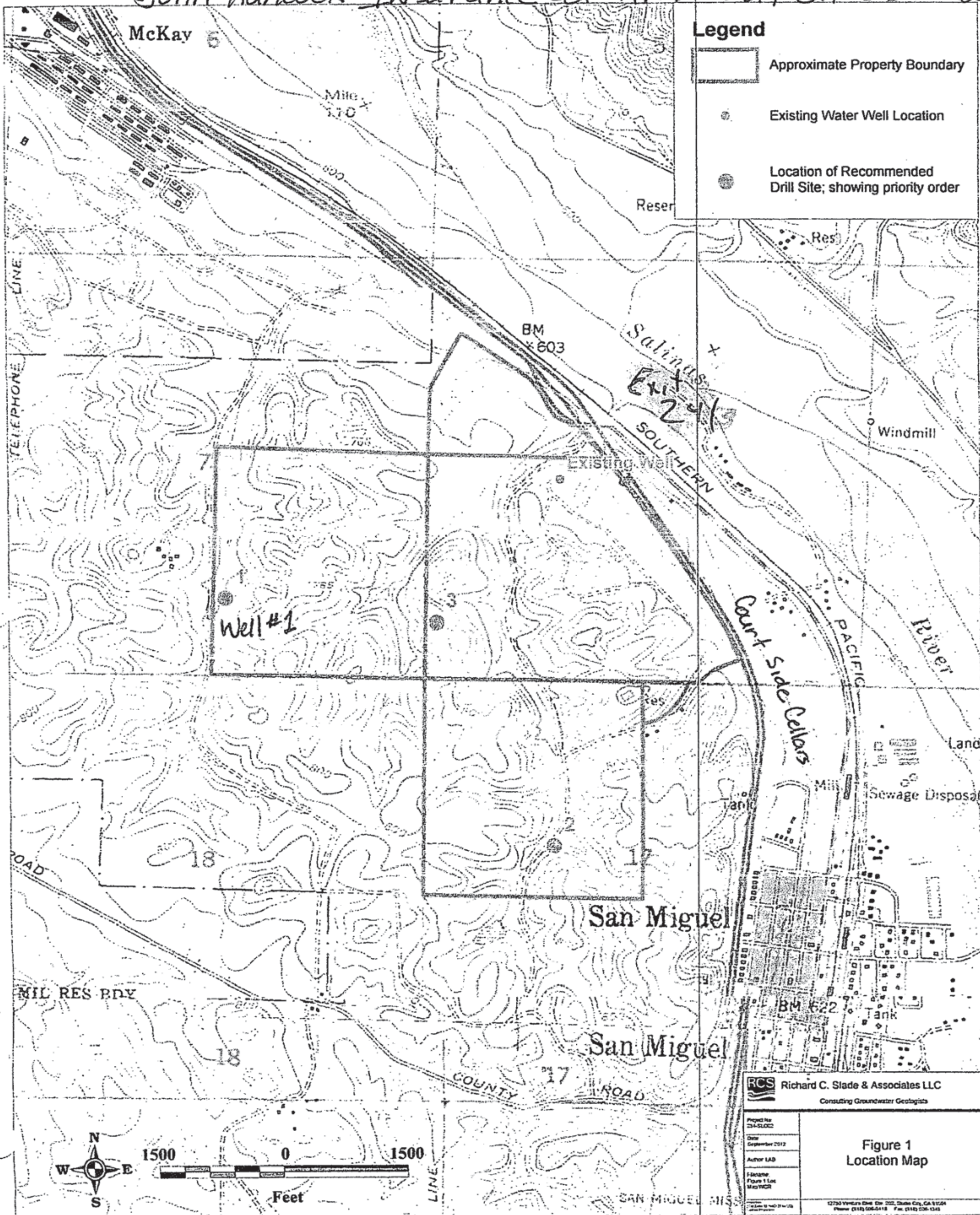


Figure 1
Location Map

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.

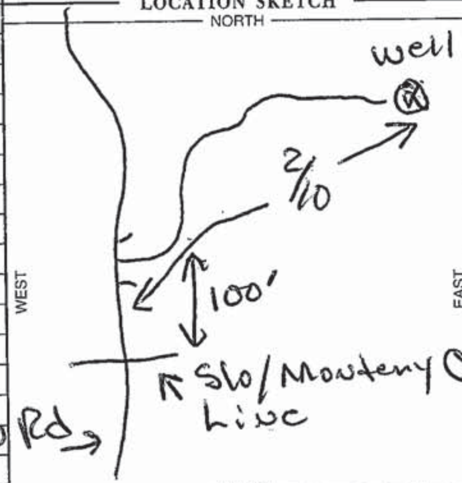
TOTAL DEPTH OF BORING 700 (Feet)
TOTAL DEPTH OF COMPLETED WELL 695 (Feet)

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 [signature] WELL DRILLER/AUTHORIZED REPRESENTATIVE DATE SIGNED 9-23-04 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 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

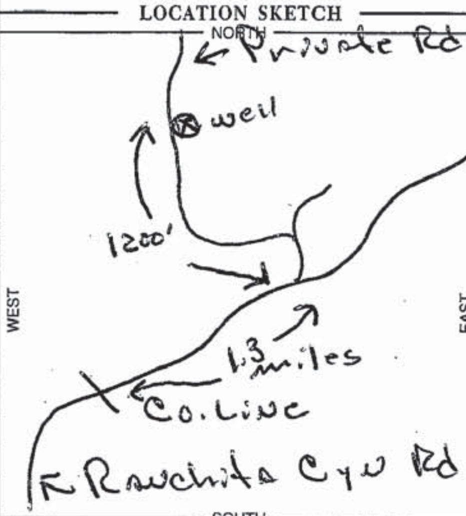
APN Book 424 Page 405 Parcel 058

Township 24S Range 13E Section 33

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

LOCATION SKETCH

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 & 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

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Signed [signature] 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

Appendix B: Methodology for Identifying Potential 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). This process differentiates between indicators of Groundwater Dependent Ecosystems (iGDEs), potential Groundwater Dependent Ecosystems, and true Groundwater Dependent Ecosystems.

- iGDEs were developed by The Nature Conservancy in partnership with the California Department of Fish and Wildlife (DFW) and DWR using the best available statewide data. The iGDEs are identified using locations of springs and seeps, wetlands, and vegetation known to use groundwater. The Nature Conservancy also uses the term "Natural Communities Commonly Associated with Groundwater" to refer to these iGDEs.
- Potential GDE are iGDEs that, through mapping analyses, may be connected to shallow groundwater and therefore be supported by shallow groundwater.
- True GDEs are potential GDE's that have been field verified to establish that they are supported by groundwater. The methodology described herein does not identify true GDEs.

The procedure consists of the following steps:

- Review geospatial data from TNC that showing indicators of groundwater dependent ecosystems (iGDEs) within the Subbasin
- Assess the connection to groundwater for indicators of groundwater dependent ecosystems
- Identify potential GDEs. Potential GDEs are iGDEs that might be connected to groundwater. Potential GDEs should be field verified before they are established as true GDEs.

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, as identified by TNC, are shown on Figure B-1.

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

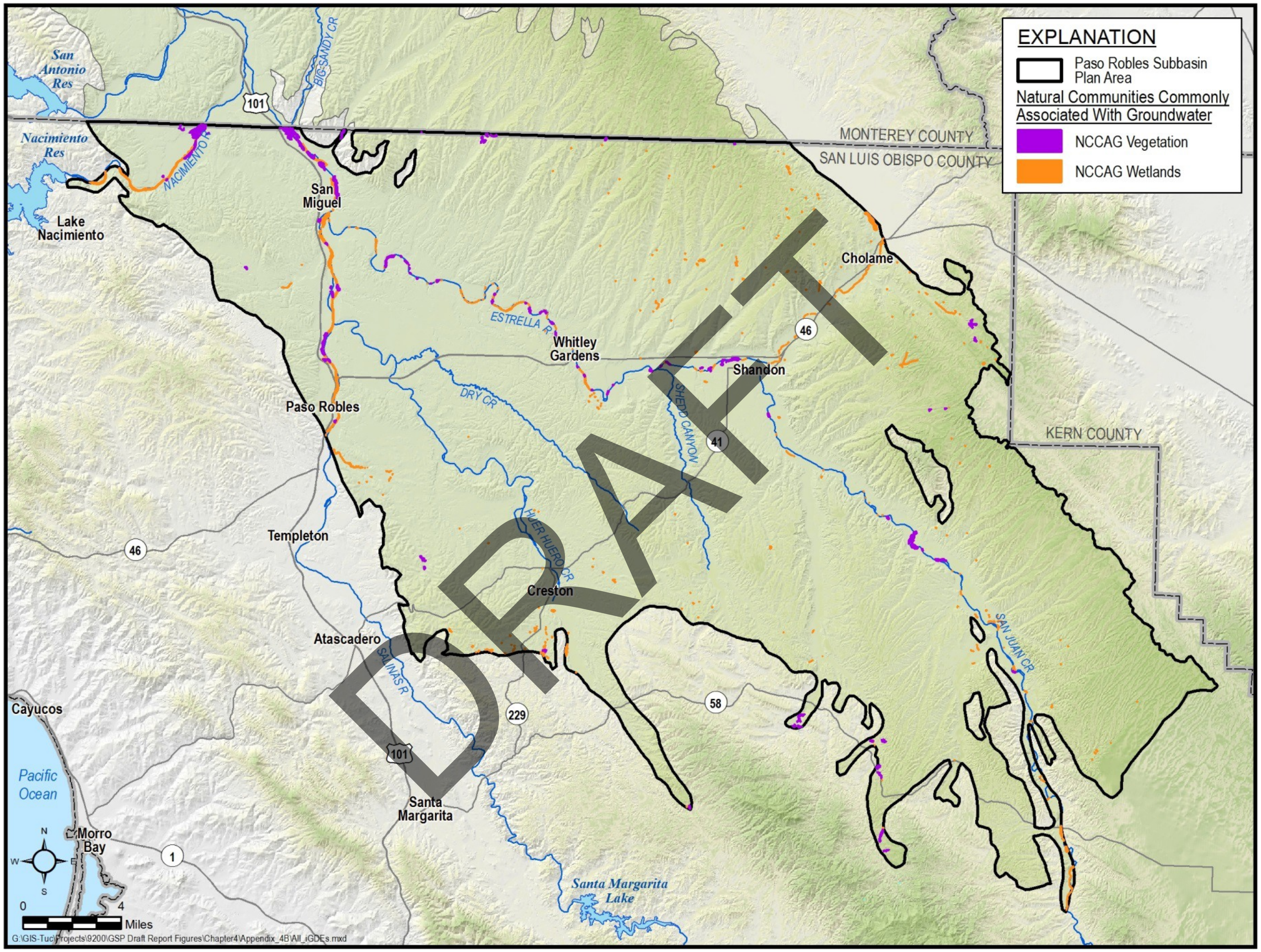


Figure B-1: Areas with Indicators of Groundwater Dependent Ecosystems (iGDEs) (*from TNC*)

CRITERIA FOR CONNECTION TO GROUNDWATER

The iGDEs identified by TNC data can only be potential 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, rather than by a regional groundwater aquifer, 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. To be considered a potential GDE, the iGDEs must satisfy at least one of the three criteria described above; or the landforms around the iGDE must suggest the area could support potential GDEs. Following the suggestions in Rhode (2018), example landforms that could support potential GDEs might be mapped springs, seeps, or a break in the slope of the ground. 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 shown on Figure B-2 was determined based on the surficial geologic map of San Luis Obispo County (San Luis Obispo 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 B-2. Most iGDEs within the Subbasin fall within the Qa extent.

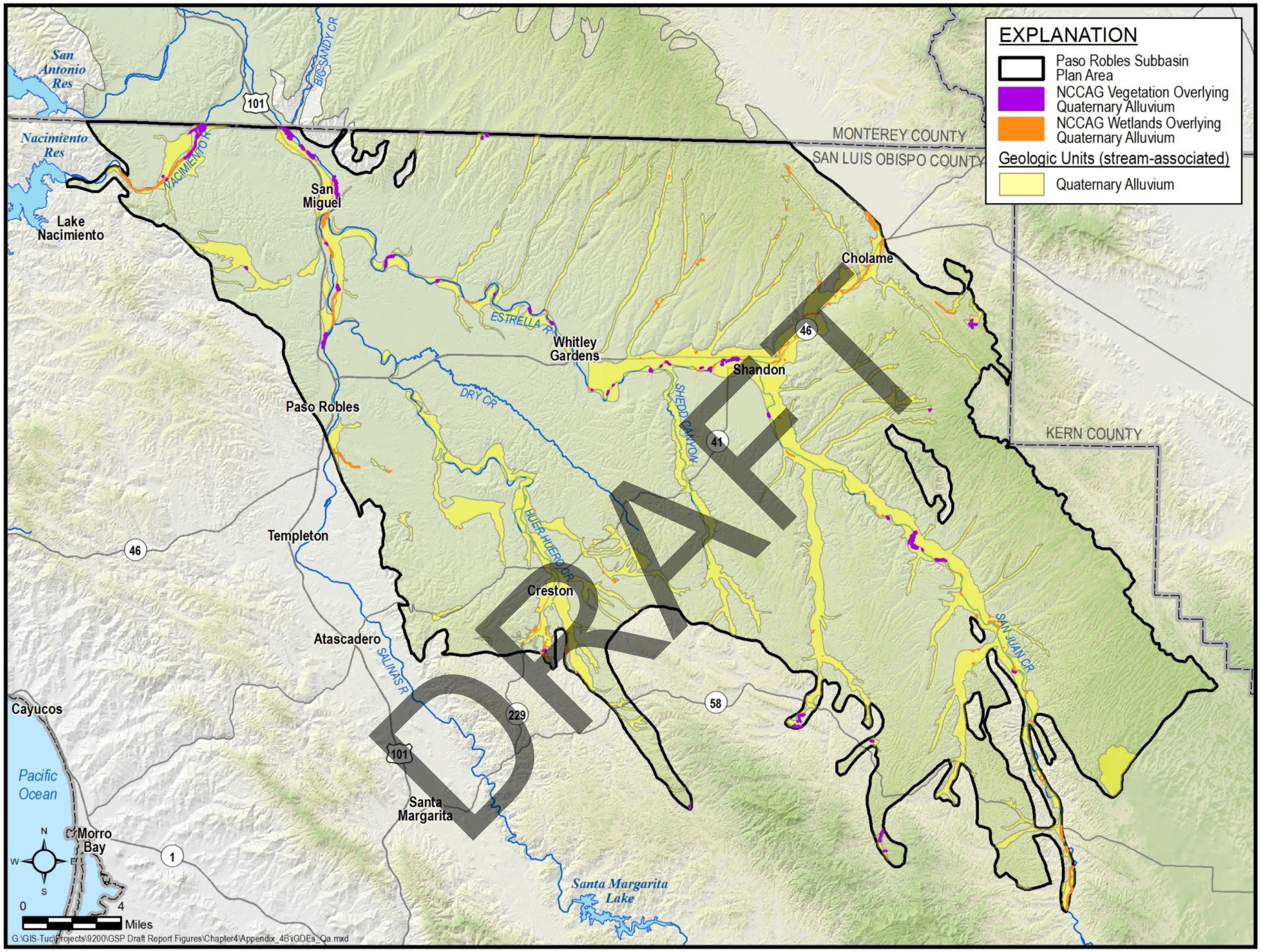


Figure B-2: iGDEs Associated with the Shallow, Unconfined Quaternary Alluvial (Qa) Aquifer

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 San Luis Obispo County staff within a network of monitoring wells. Figure B-3 shows the locations of San Luis Obispo 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 B-3. Wells where depth to water is greater than 30 feet are shown in yellow. Results from the groundwater model were used to supplement the measured groundwater level data. The simulated spring 2016 groundwater elevations were analyzed to further identify areas where depth to water is less than 30 feet. Based on the measured groundwater level data and model results, iGDEs overlying areas where estimated depth to groundwater is less than 30 feet are shown on Figure B-3.

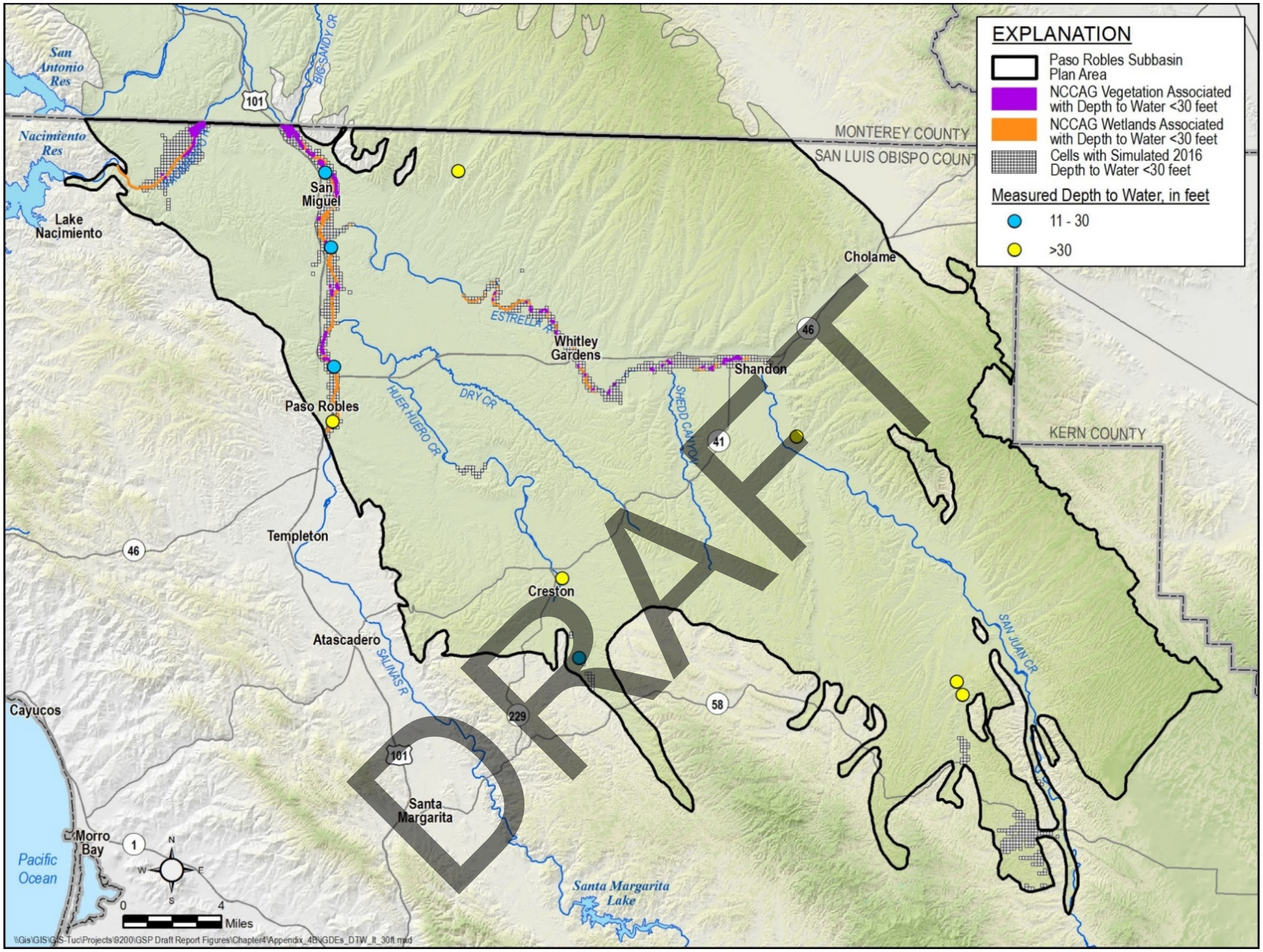


Figure B-3: Qa monitoring wells, Model Cells with Depth to Water Less than 30 Feet, and Potential GDEs based on Depth to Groundwater Less than 30 Feet

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 B-4 shows the location of NHD seeps and springs. iGDEs within 0.5 miles of a seep/spring point are classified as potential GDEs.

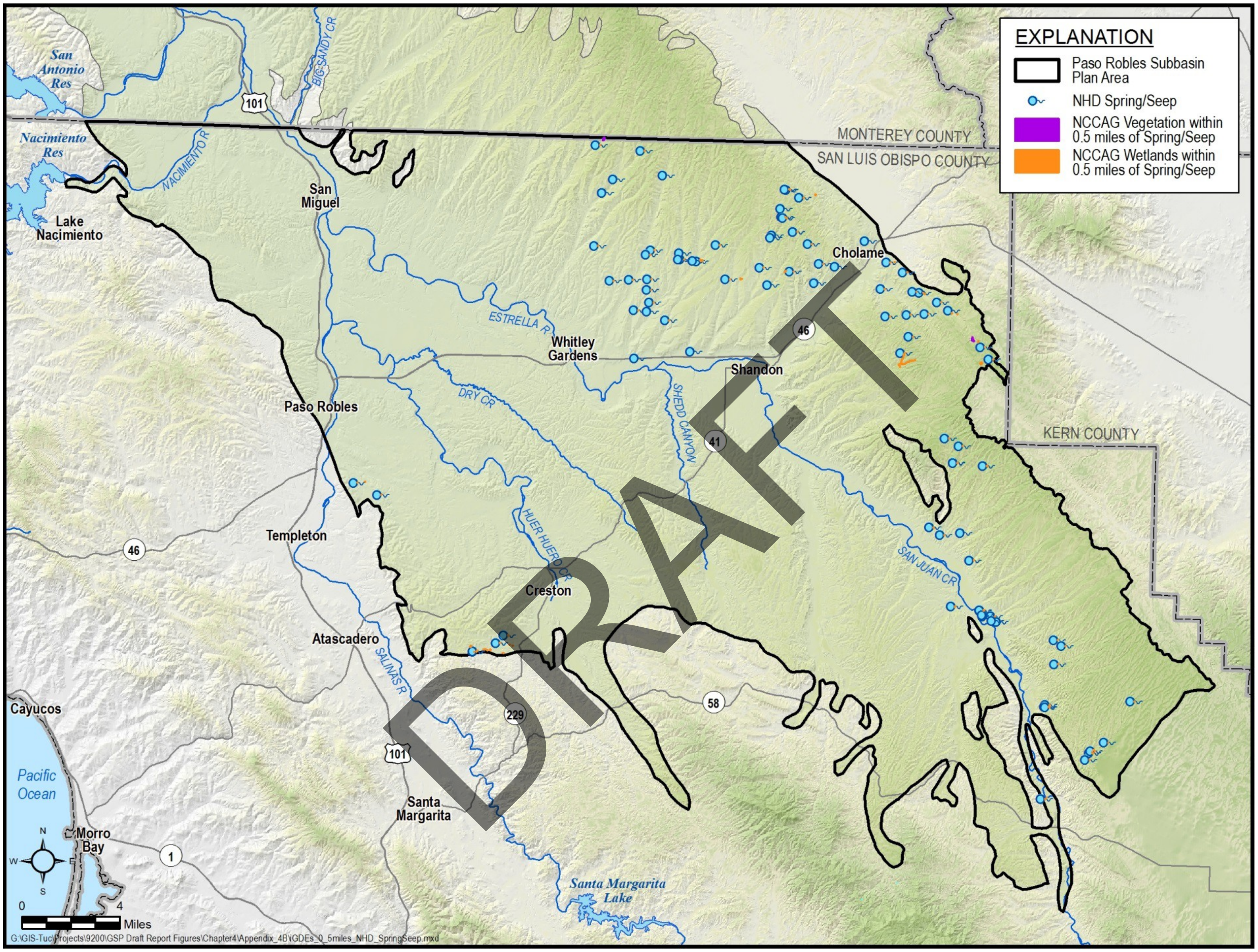


Figure B-4: NHD Springs and Seeps and iGDEs Within 0.5 Miles of a Spring or Seep

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 landforms that suggest potential GDEs, 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 B-5 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 B-6; 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 B-6 shows all potential GDEs associated with known springs or seeps or located in areas that potentially host springs or seeps.

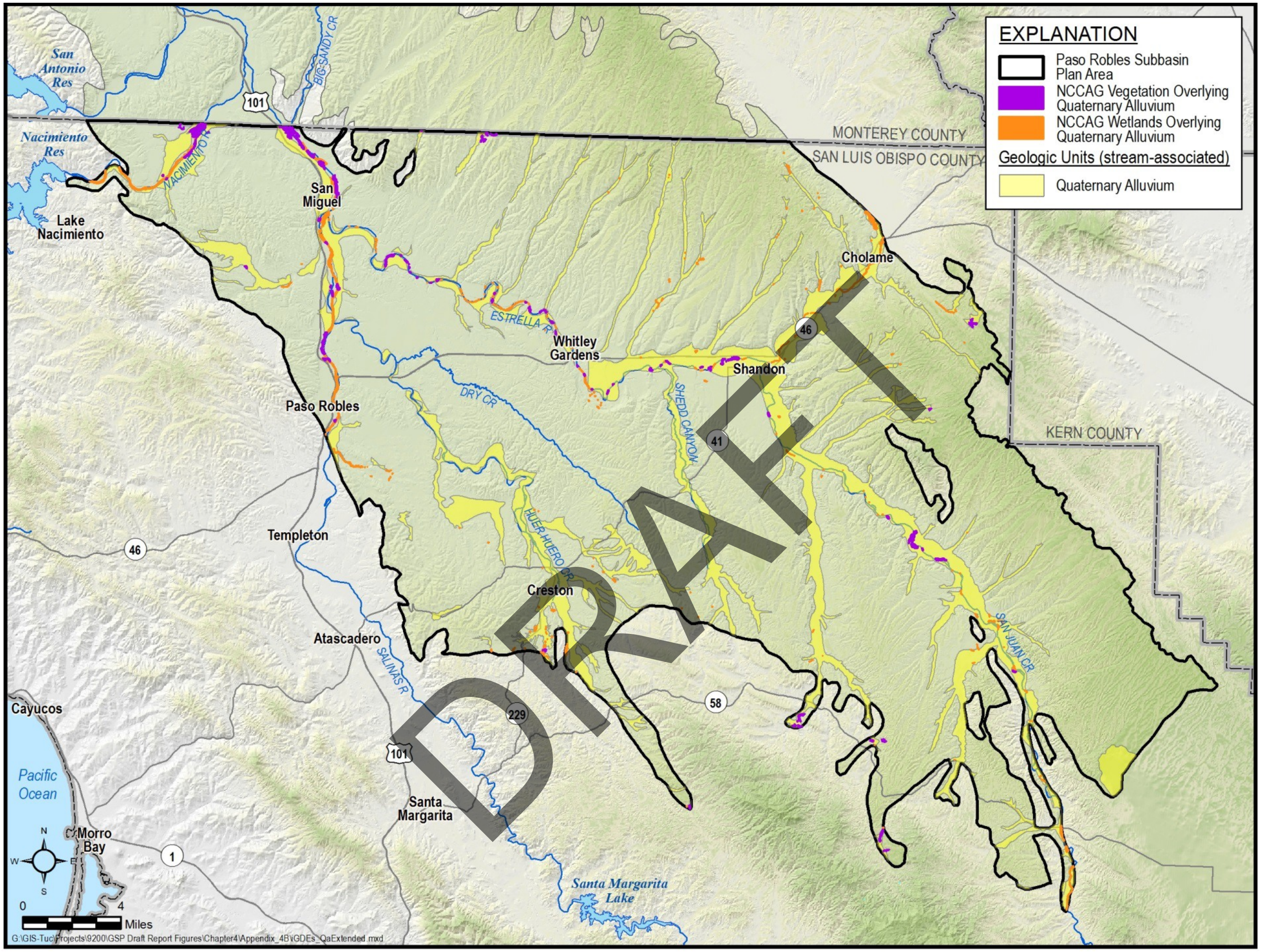


Figure B-5: iGDEs Associated with Quaternary Alluvium (Overlying, Within 0.5 miles, or Manually Selected)

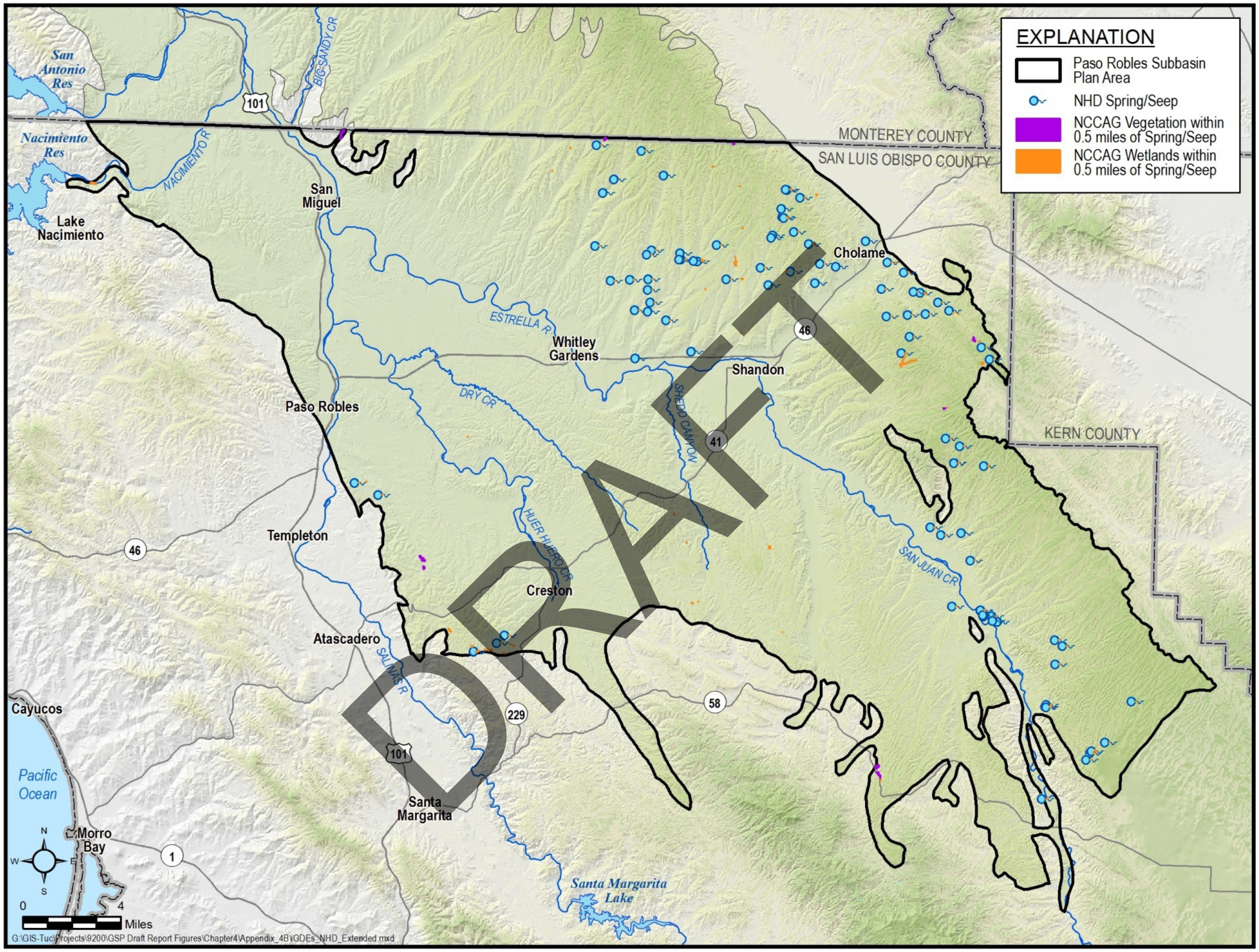


Figure B-6: iGDEs Associated with Springs or Seeps or Located in an Area with Potential Springs or Seeps

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 B-7. Field verification is necessary to assess whether these potential GDEs are true GDEs.

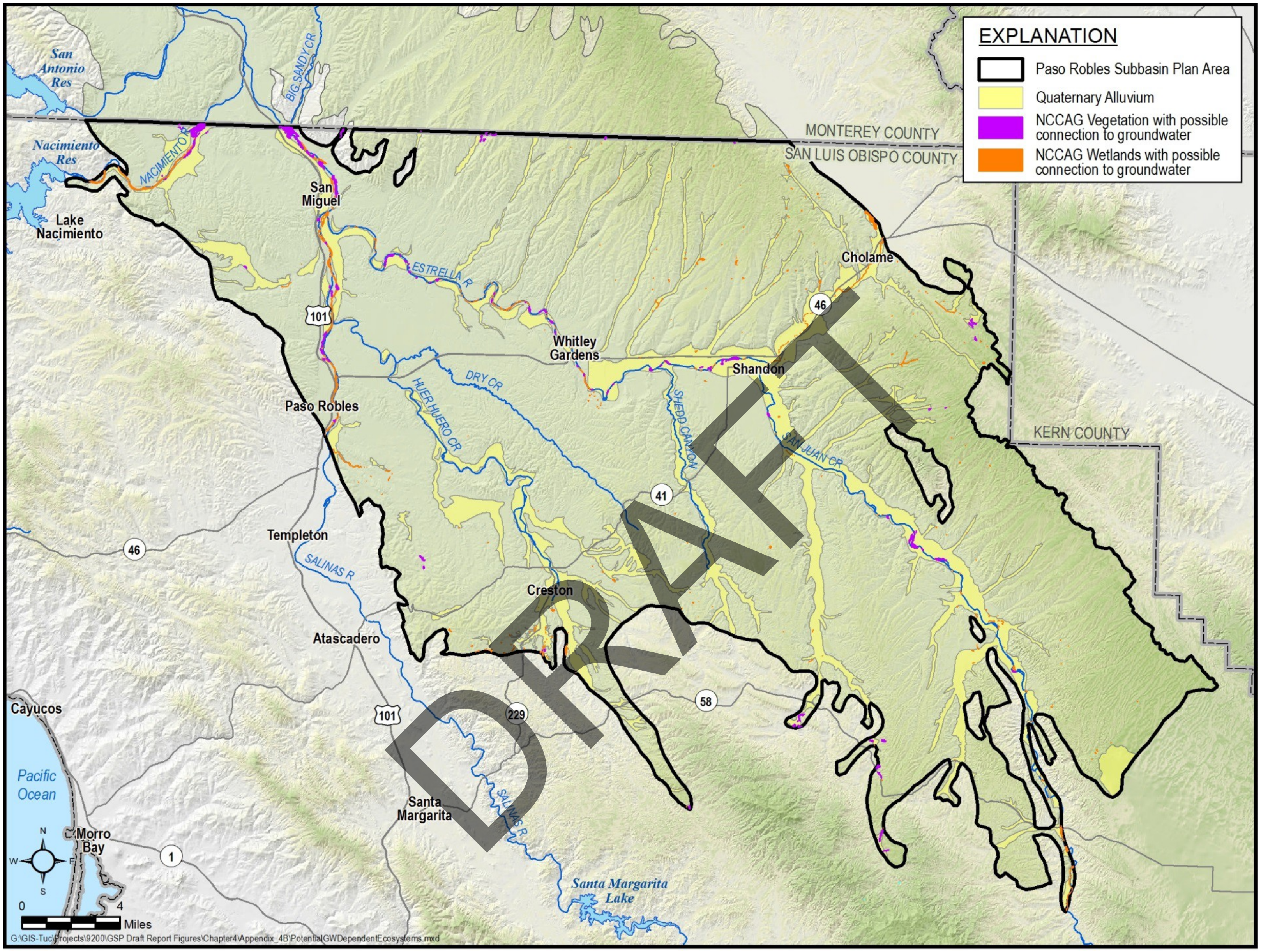


Figure B-7: Extent of Potential GDEs

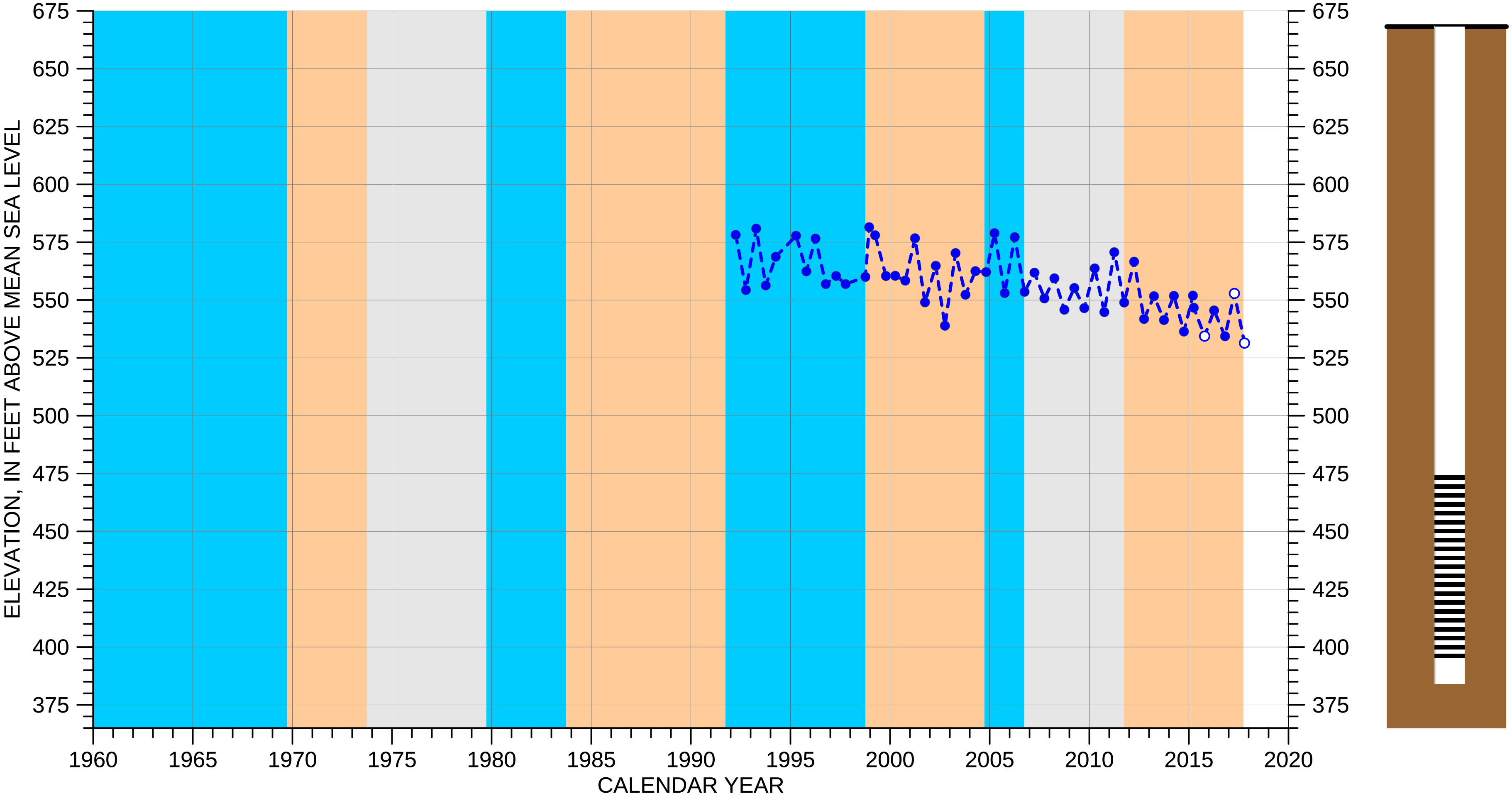
REFERENCES

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

APPENDIX C
HYDROGRAPHS



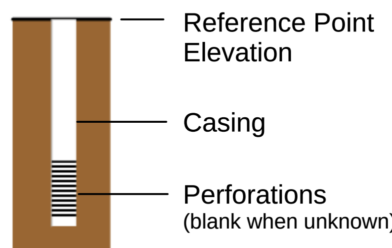
EXPLANATION

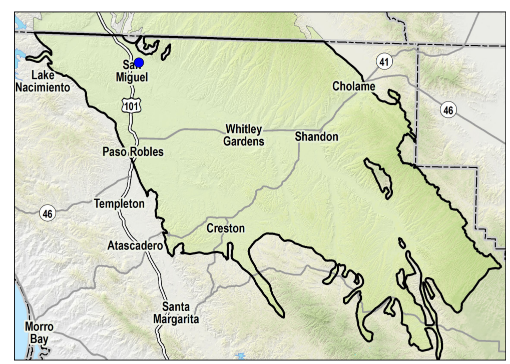
GROUNDWATER ELEVATION

MEASUREMENT NOT VERIFIED*

CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET





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

* Measurement reported as not static

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 25S/12E-16K04

MONTGOMERY & ASSOCIATES

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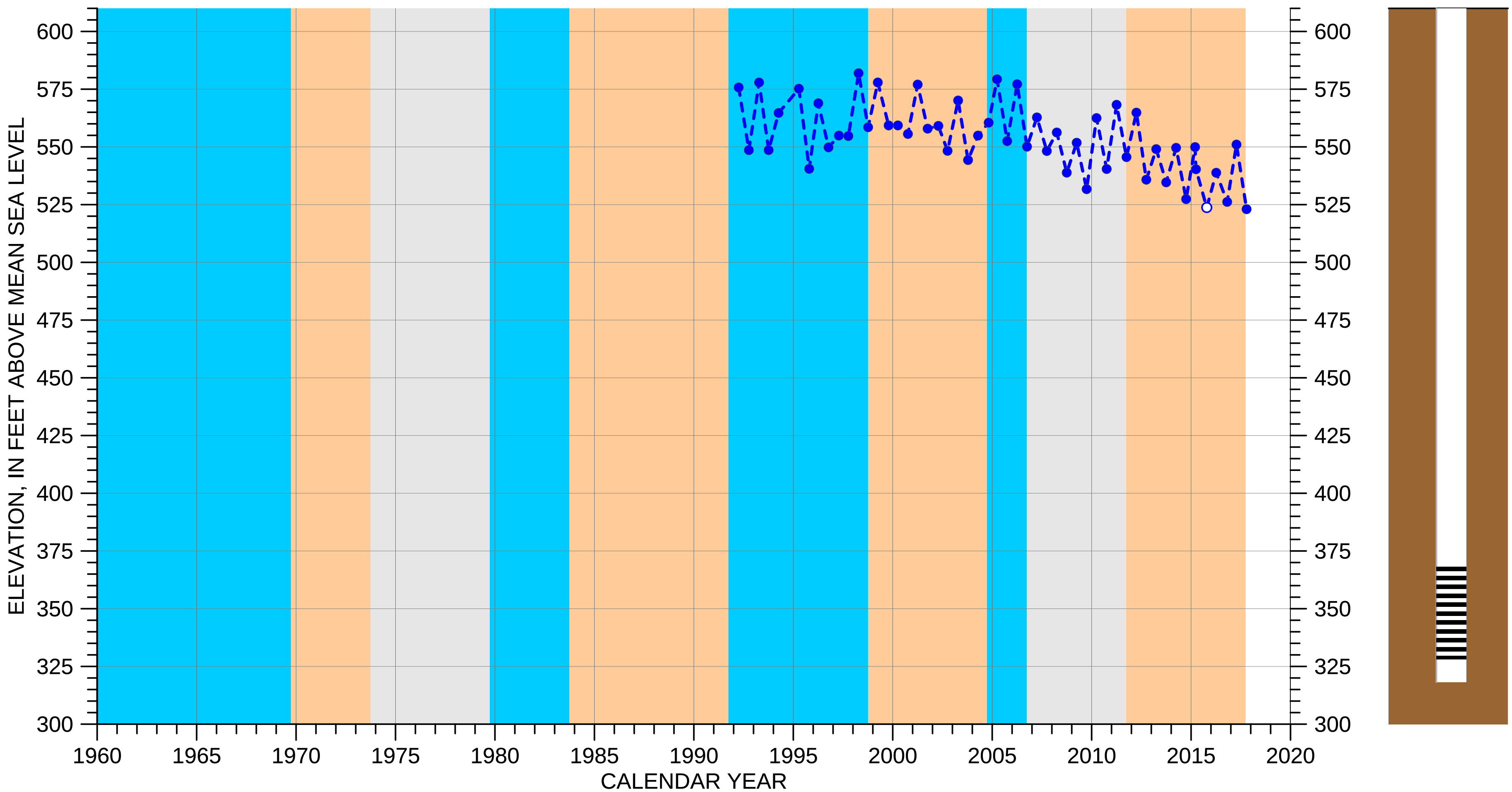


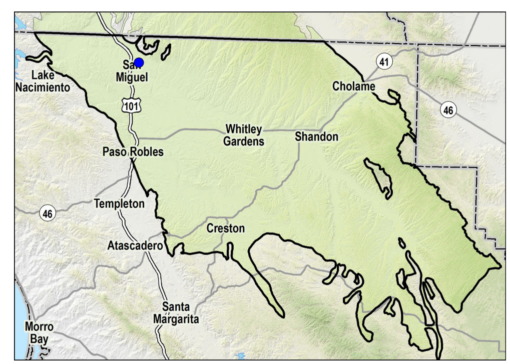
EXPLANATION

GROUNDWATER ELEVATION

MEASUREMENT NOT VERIFIED*

CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET



Well Depth: 350 feet
Screened Interval: 300-310, 330-340 feet below ground surface
Reference Point Elevation: 669.8 feet above mean sea level

* Measurement reported as not static

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 25S/12E-16K05

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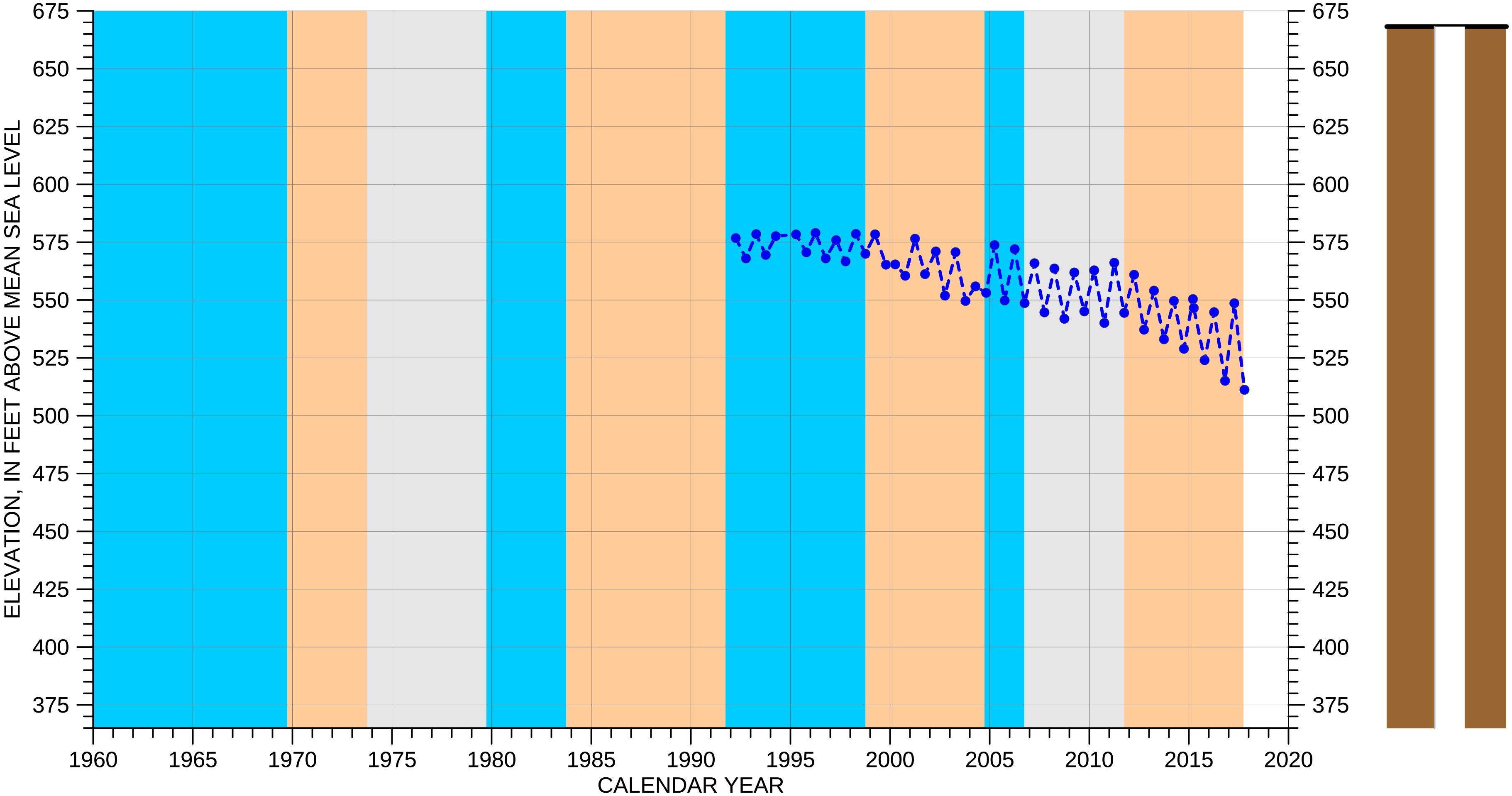


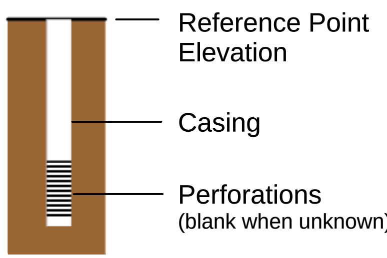
EXPLANATION

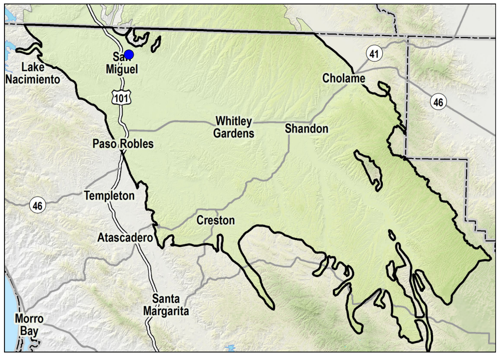
GROUNDWATER ELEVATION

MEASUREMENT NOT VERIFIED*

CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET





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

* Measurement reported as not static

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 25S/12E-16K06

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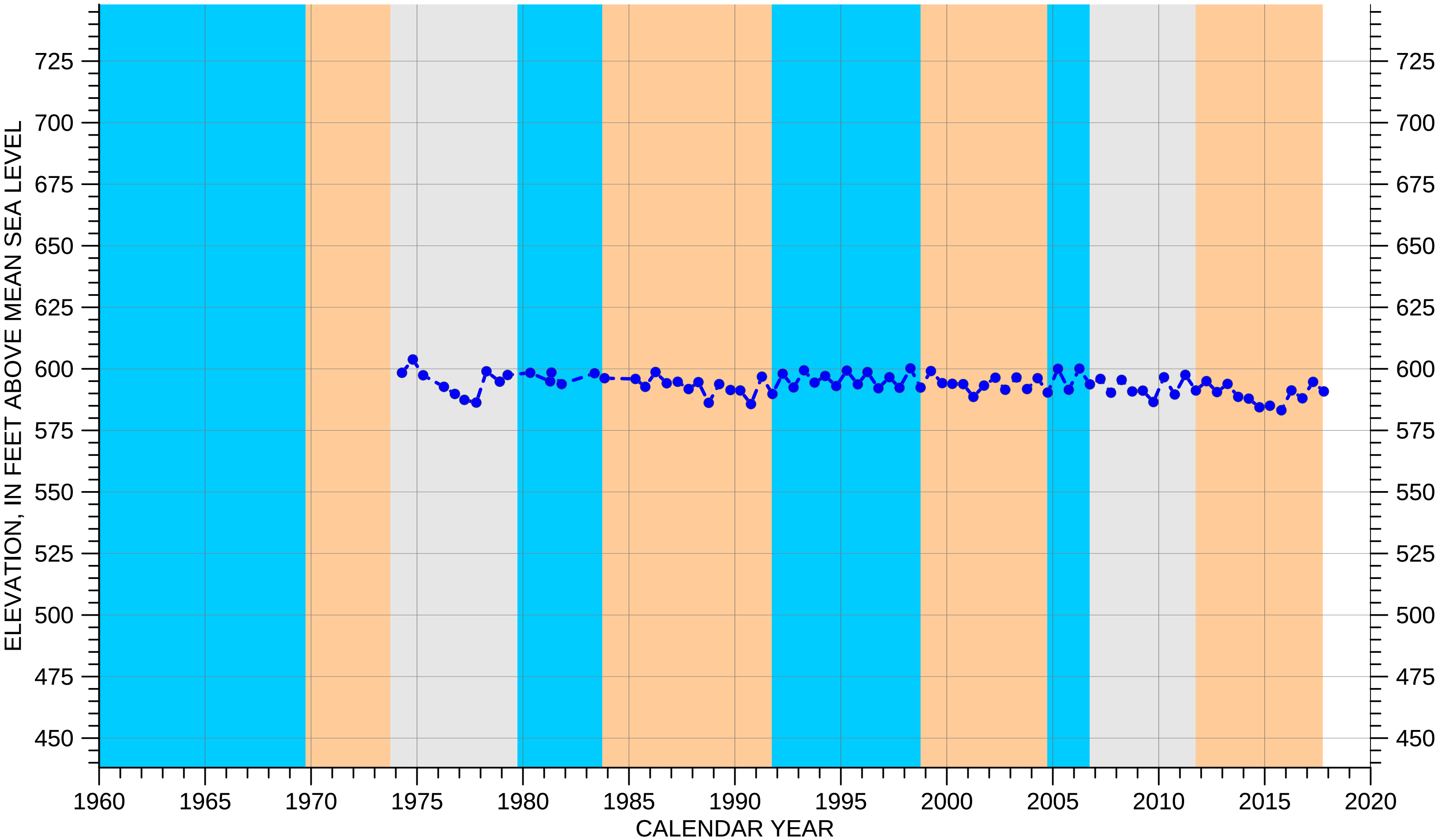


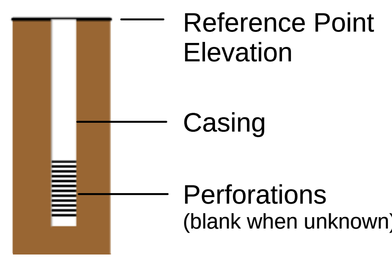
EXPLANATION

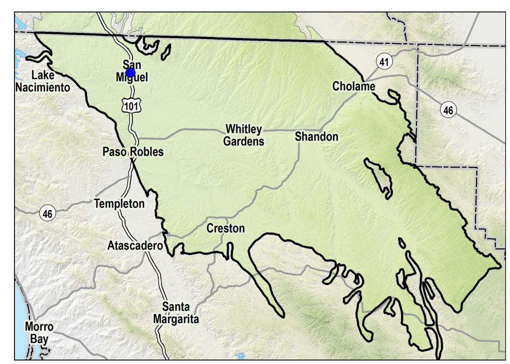
GROUNDWATER ELEVATION

MEASUREMENT NOT VERIFIED*

CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET





Well Depth: Upper Paso Robles Formation (GSSI, 2016)
Screened Interval: unknown
Reference Point Elevation: 625 feet above mean sea level

* Measurement reported as not static

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 25S/12E-20K03

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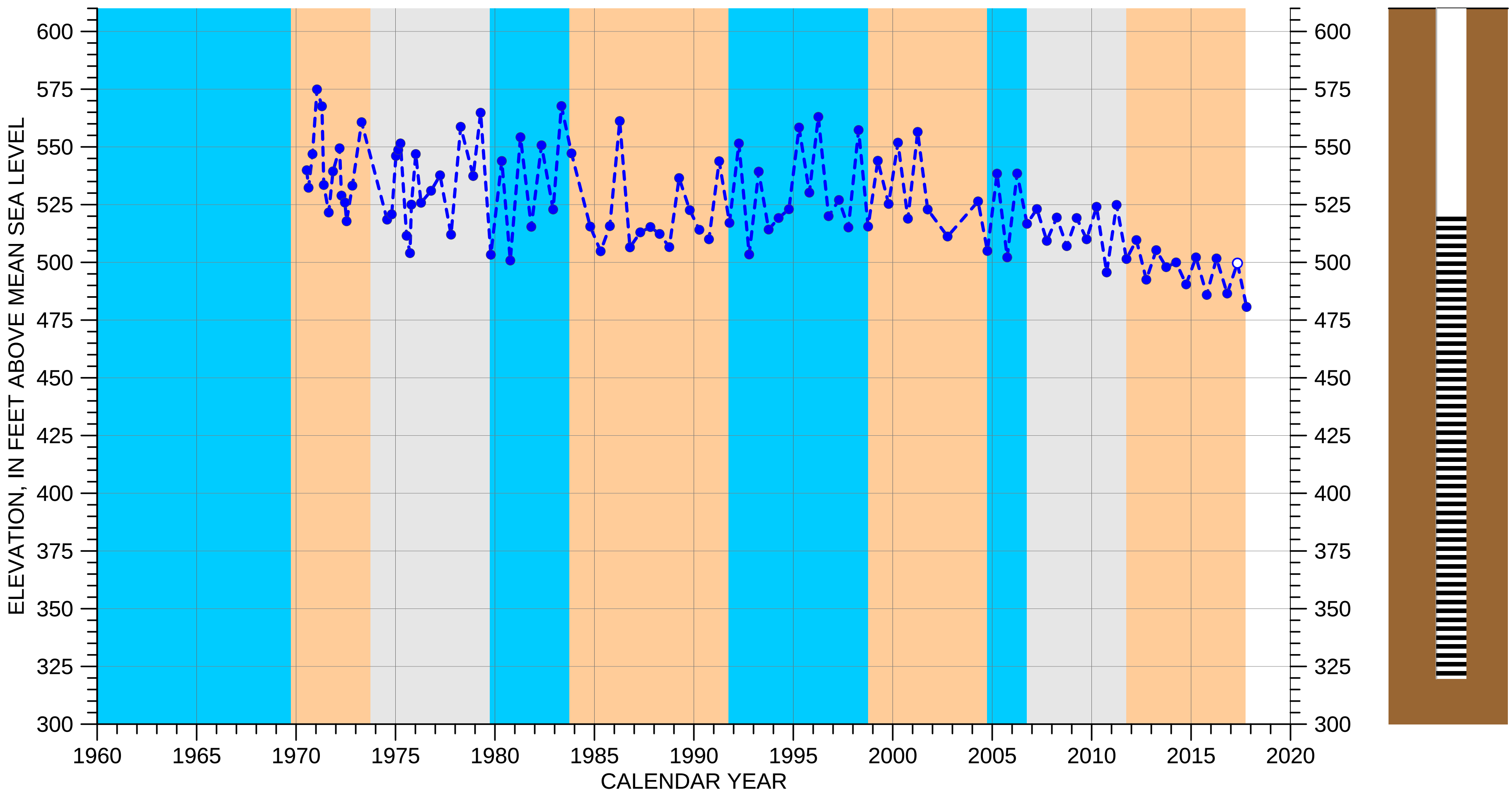


EXPLANATION

GROUNDWATER ELEVATION

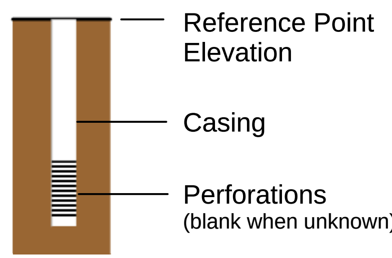
MEASUREMENT NOT VERIFIED*

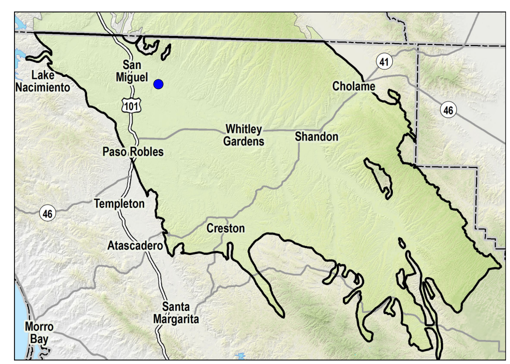
CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET

Well Depth: 400 feet
Screened Interval: 200-400 feet below ground surface
Reference Point Elevation: 719.7 feet above mean sea level

* Measurement reported as not static





HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 25S/12E-26L01

MONTGOMERY & ASSOCIATES

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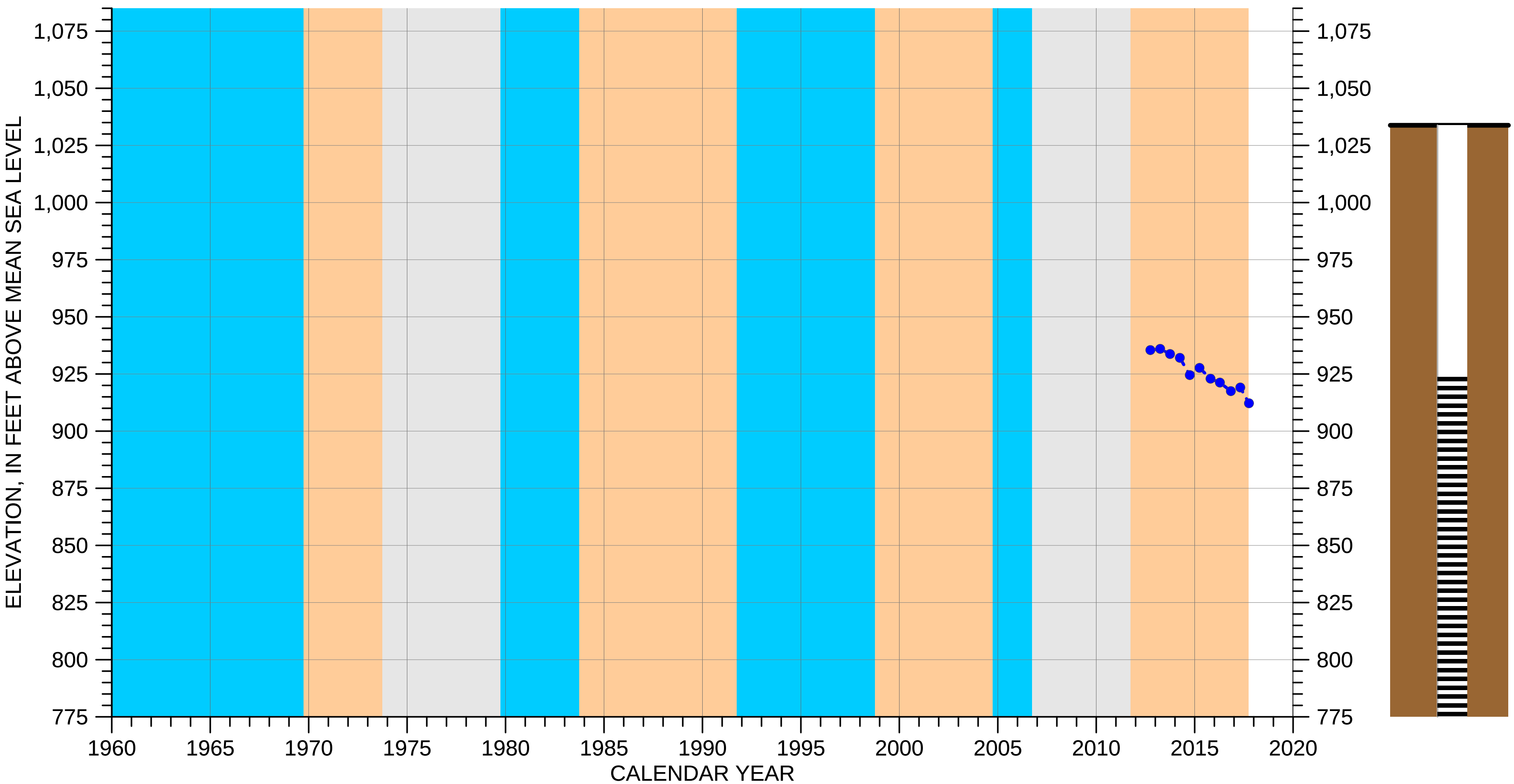
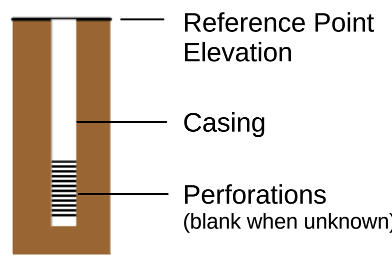


EXPLANATION

GROUNDWATER ELEVATION

MEASUREMENT NOT VERIFIED*

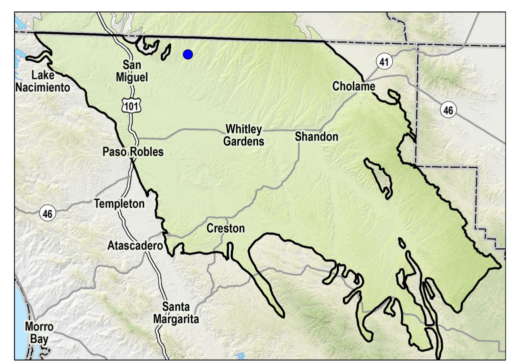


CLIMATE PERIOD CLASSIFICATION

DRY   AVERAGE/ALTERNATING   WET

Well Depth: 270 feet
Screened Interval: 110-270 feet below ground surface
Reference Point Elevation: 1033.8 feet above mean sea level

* Measurement reported as not static



HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 25S/13E-08L02

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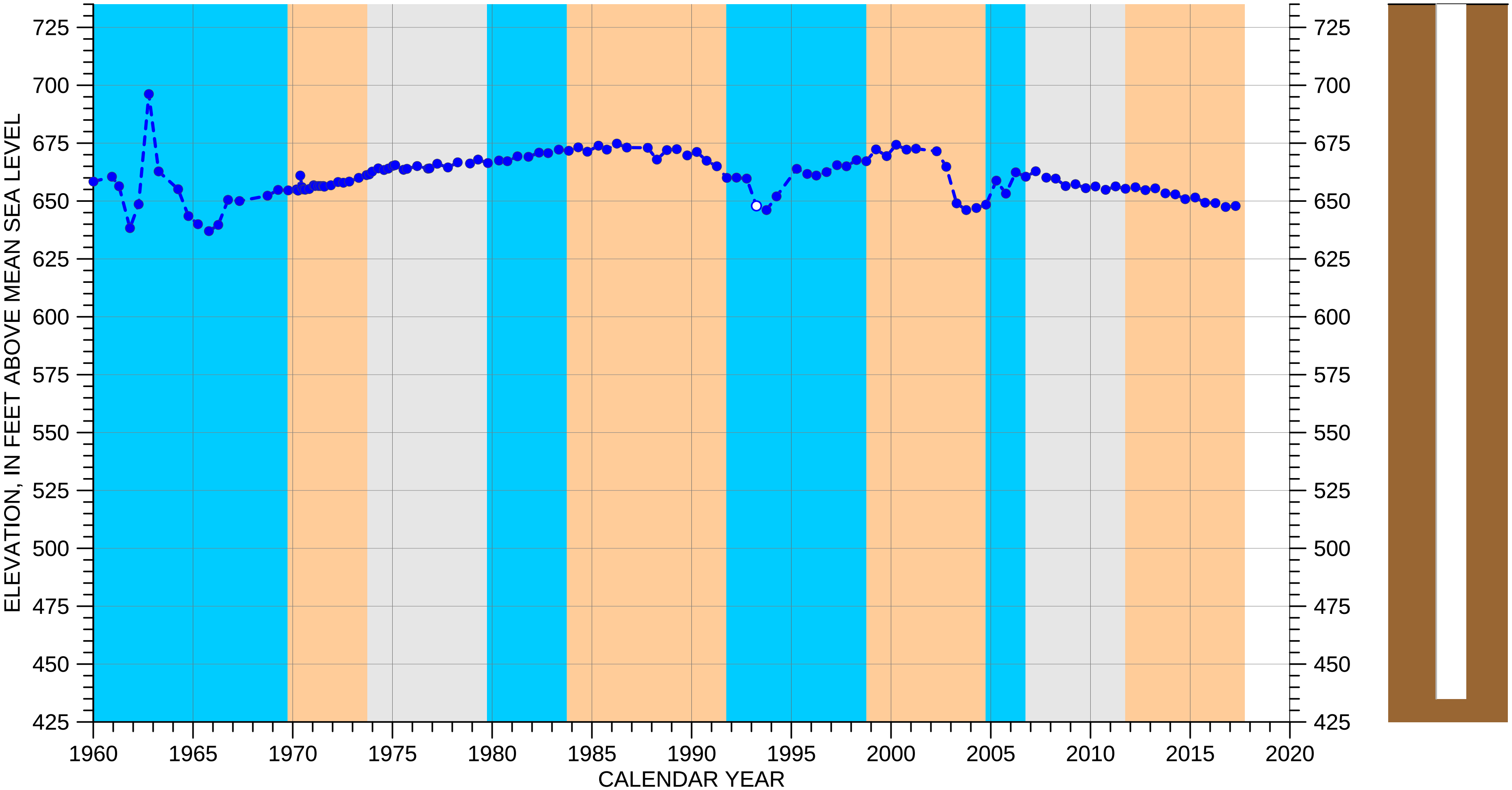


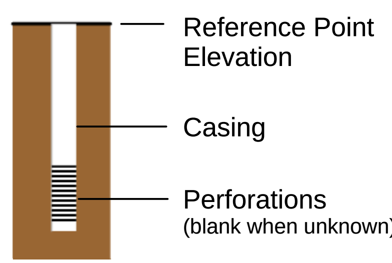
EXPLANATION

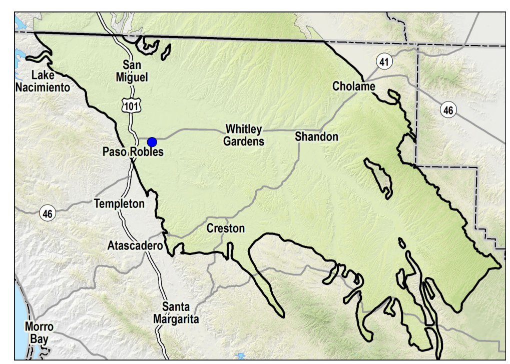
GROUNDWATER ELEVATION

MEASUREMENT NOT VERIFIED*

CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET





Well Depth: 400 feet
Screened Interval: unknown
Reference Point Elevation: 835 feet above mean sea level

* Measurement reported as not static

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 26S/12E-26E07

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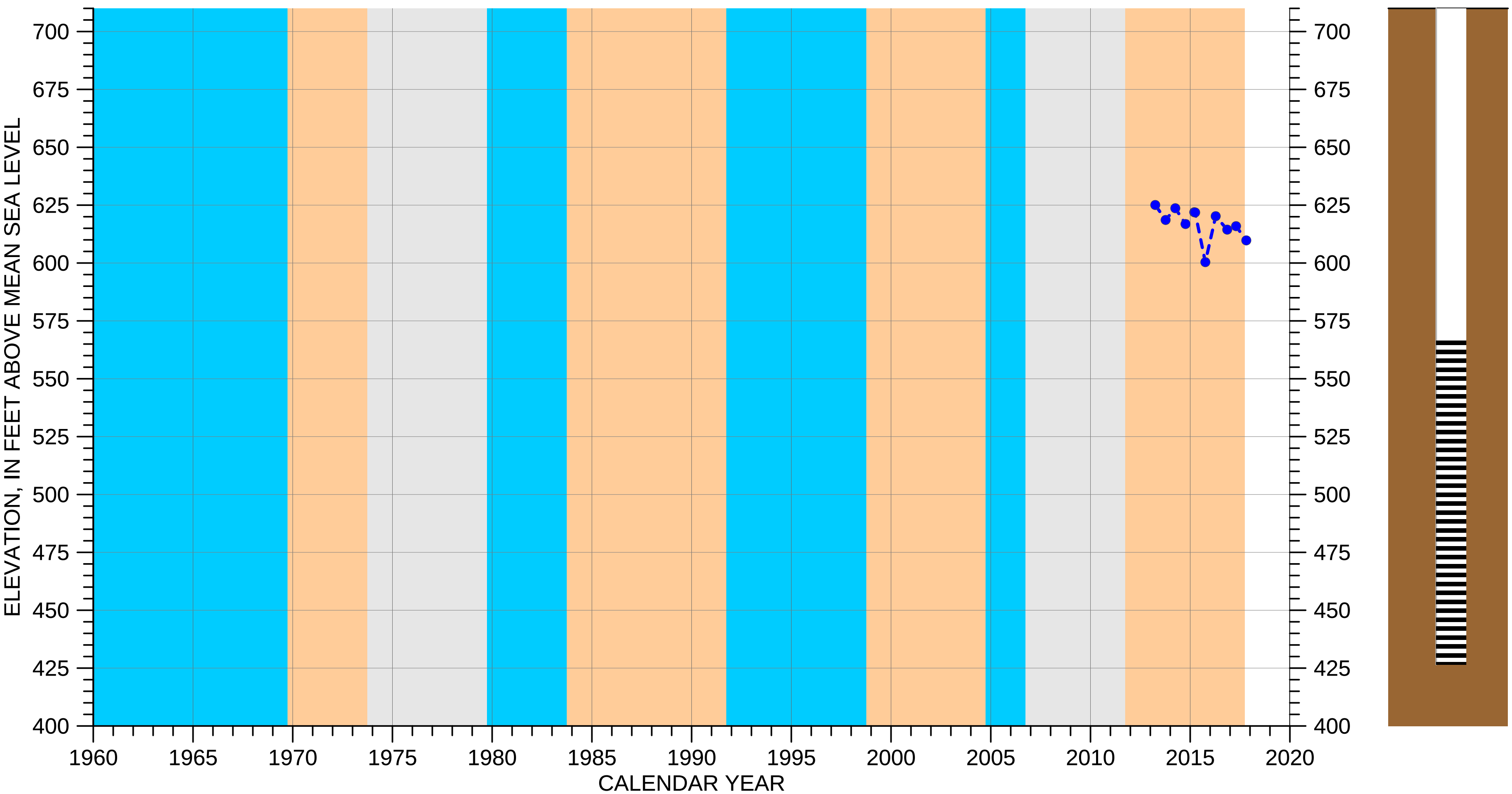


EXPLANATION

GROUNDWATER ELEVATION

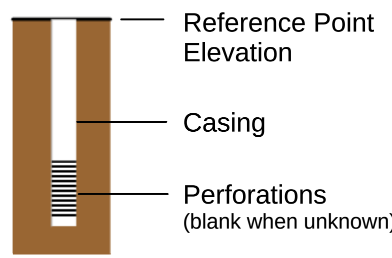
MEASUREMENT NOT VERIFIED*

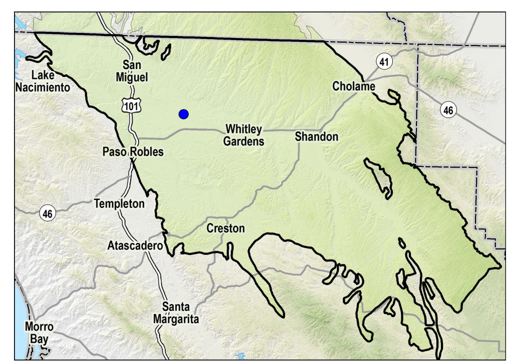
CLIMATE PERIOD CLASSIFICATION

DRY

AVERAGE/ALTERNATING

WET





Well Depth: 400 feet
Screened Interval: 260-400 feet below ground surface
Reference Point Elevation: 827.9 feet above mean sea level

* Measurement reported as not static

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 26S/13E-08M01

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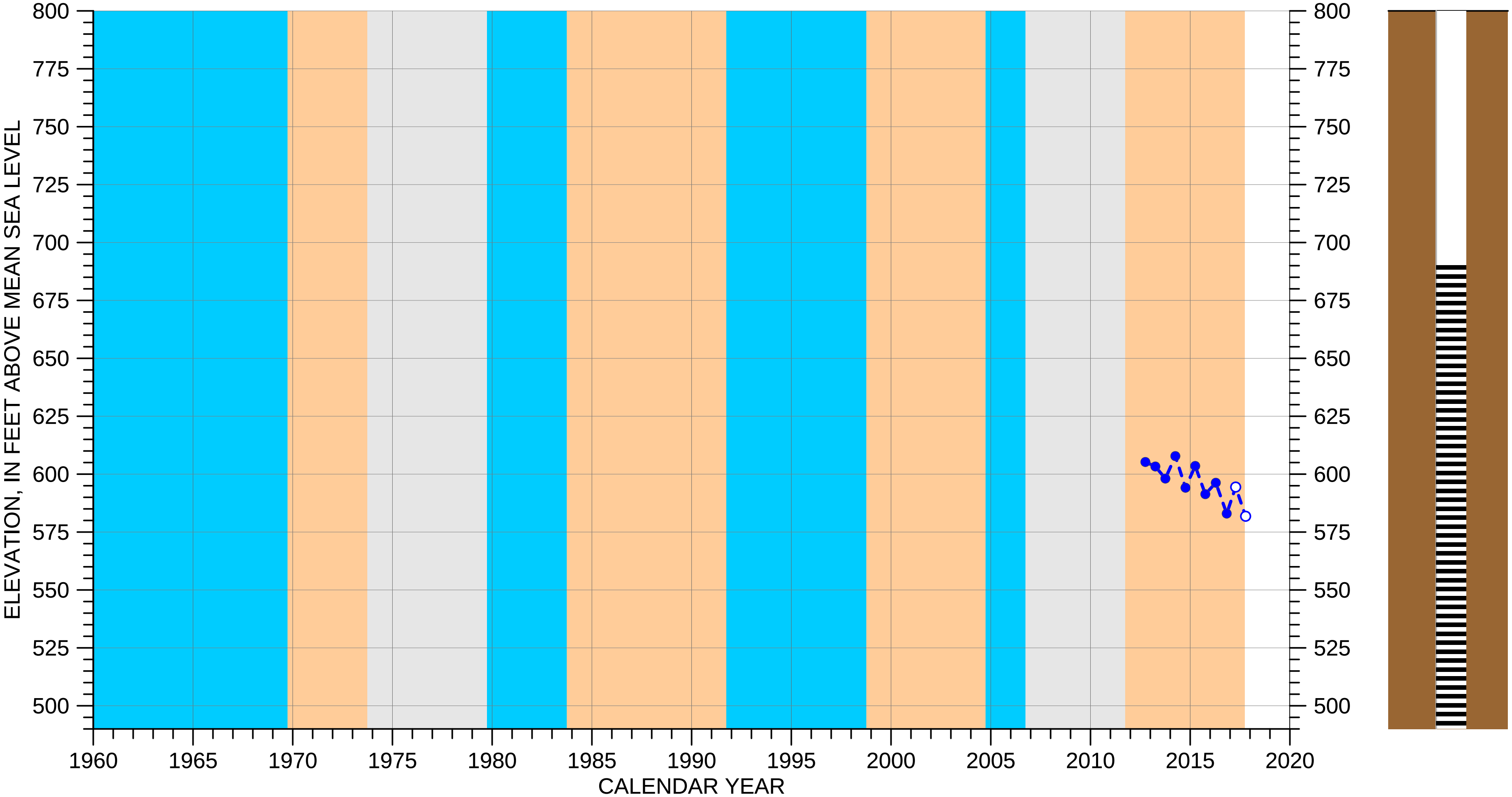
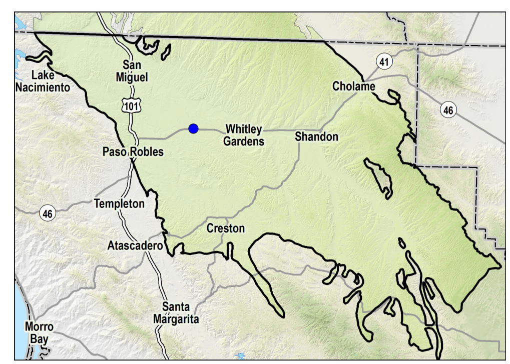


EXPLANATION

GROUNDWATER ELEVATION

MEASUREMENT NOT VERIFIED*



CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET

Well Depth: 400 feet
Screened Interval: 200-400 feet below ground surface
Reference Point Elevation: 890.2 feet above mean sea level

* Measurement reported as not static

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 26S/13E-16N01

MONTGOMERY & ASSOCIATES

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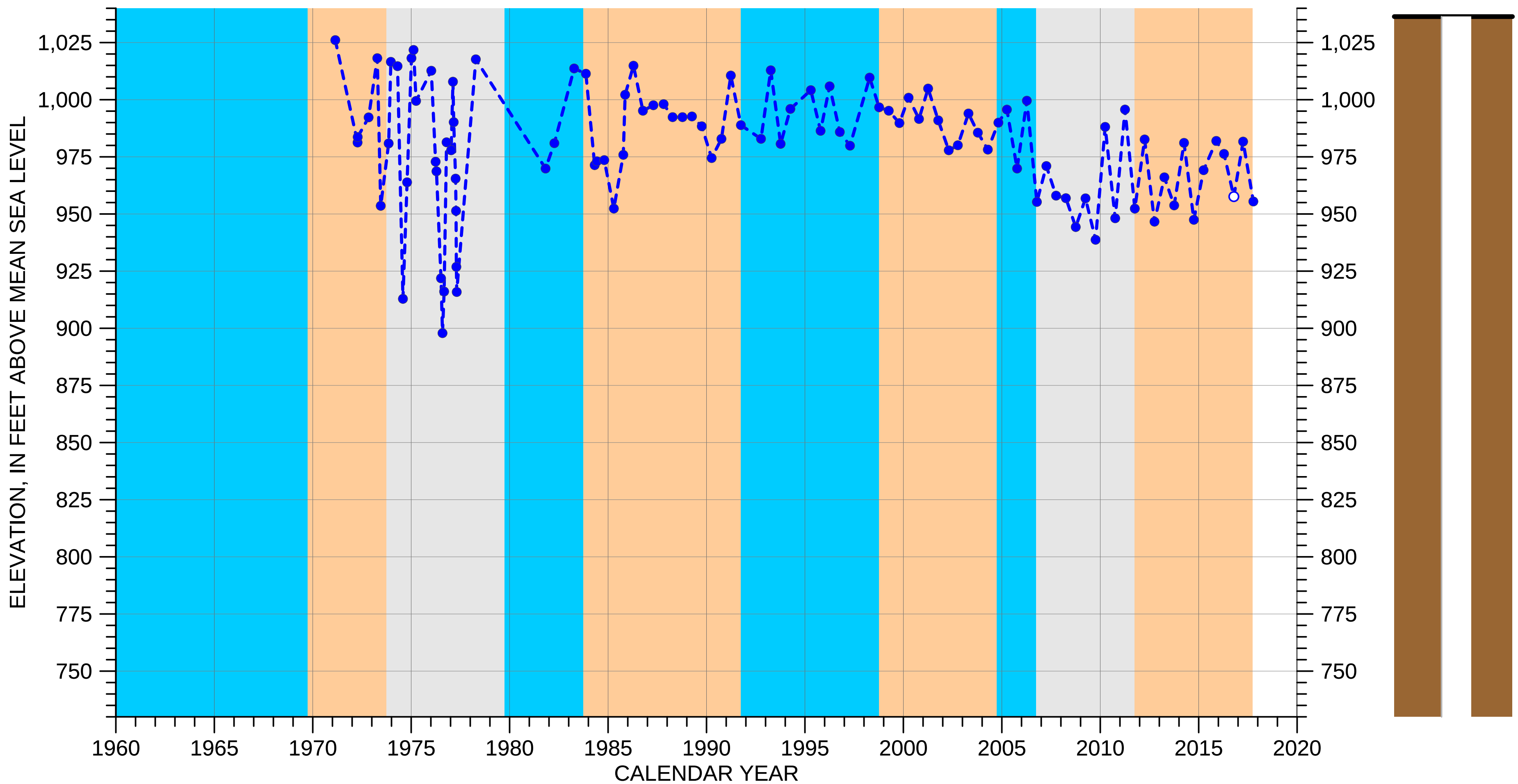


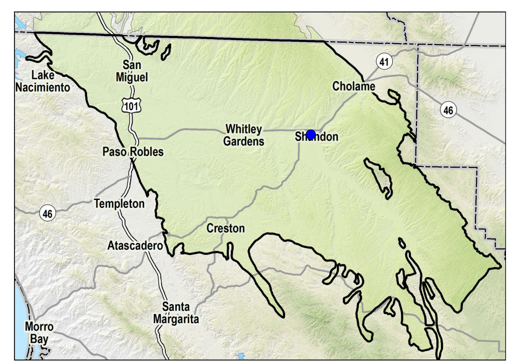
EXPLANATION

GROUNDWATER ELEVATION

MEASUREMENT NOT VERIFIED*

CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET



Well Depth: 385 feet
Screened Interval: unknown
Reference Point Elevation: 1036.87 feet above mean sea level

* Measurement reported as not static

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 26S/15E-20B02

MONTGOMERY & ASSOCIATES

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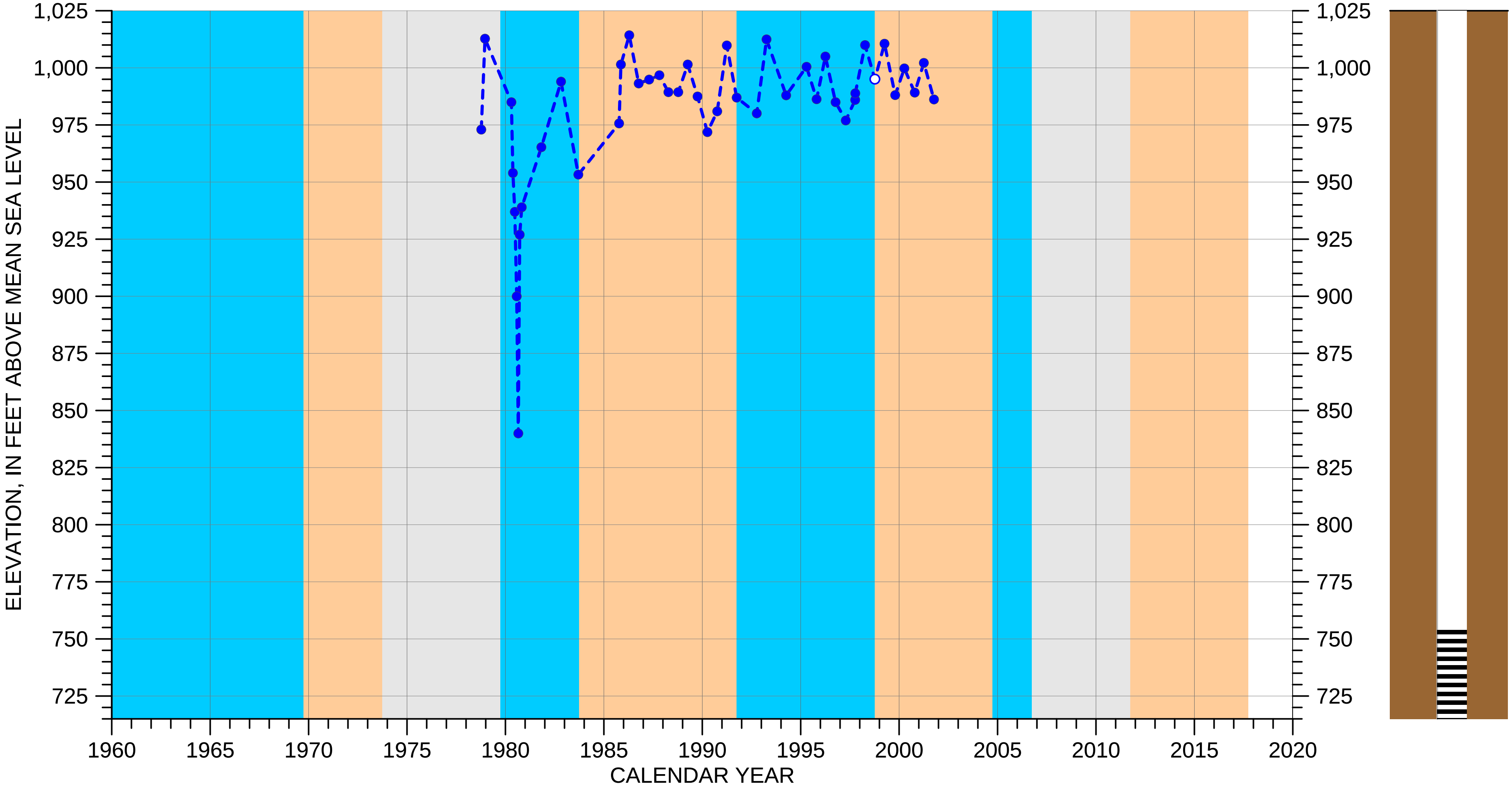


EXPLANATION

GROUNDWATER ELEVATION

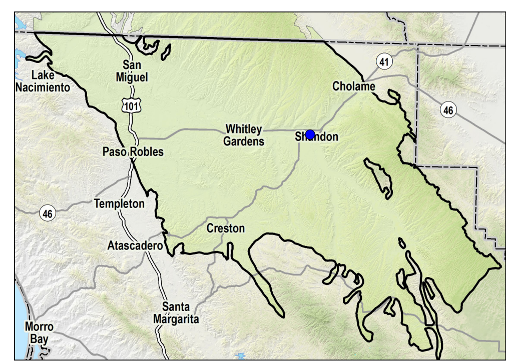
MEASUREMENT NOT VERIFIED*

CLIMATE PERIOD CLASSIFICATION

DRY | AVERAGE/ALTERNATING | WET

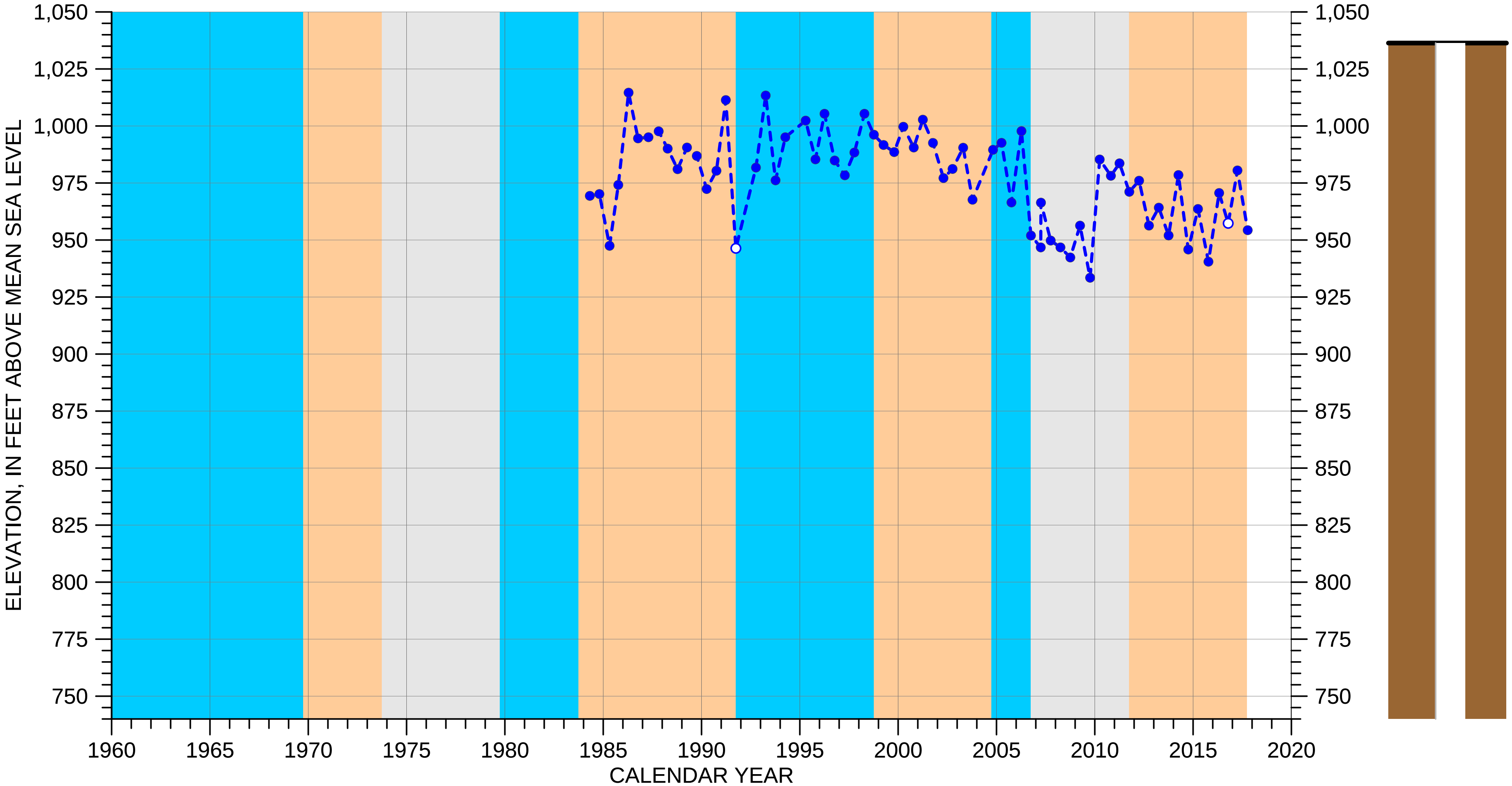
Well Depth: 400 feet
Screened Interval: 285-295, 355-395 feet below ground surface
Reference Point Elevation: ~1039 feet above mean sea level

* Measurement reported as not static



HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 26S/15E-20B03

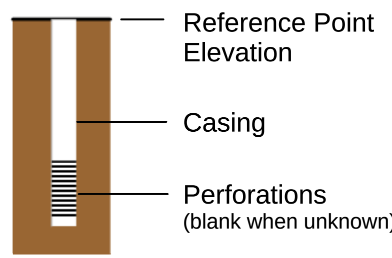
S:\projects\9200_Paso Robles GSP\SMC\Data\Figures\Hydrographs\grf\AppendixC\Fig11_26S_15E-20B03.grf

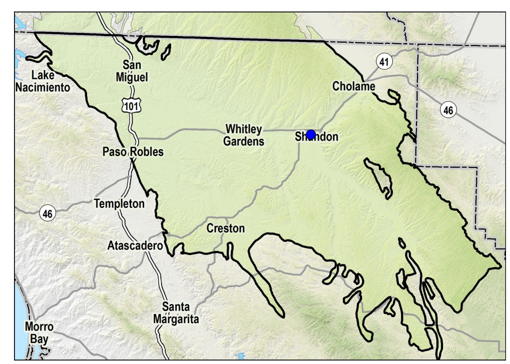


EXPLANATION

GROUNDWATER ELEVATION

MEASUREMENT NOT VERIFIED*





CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET

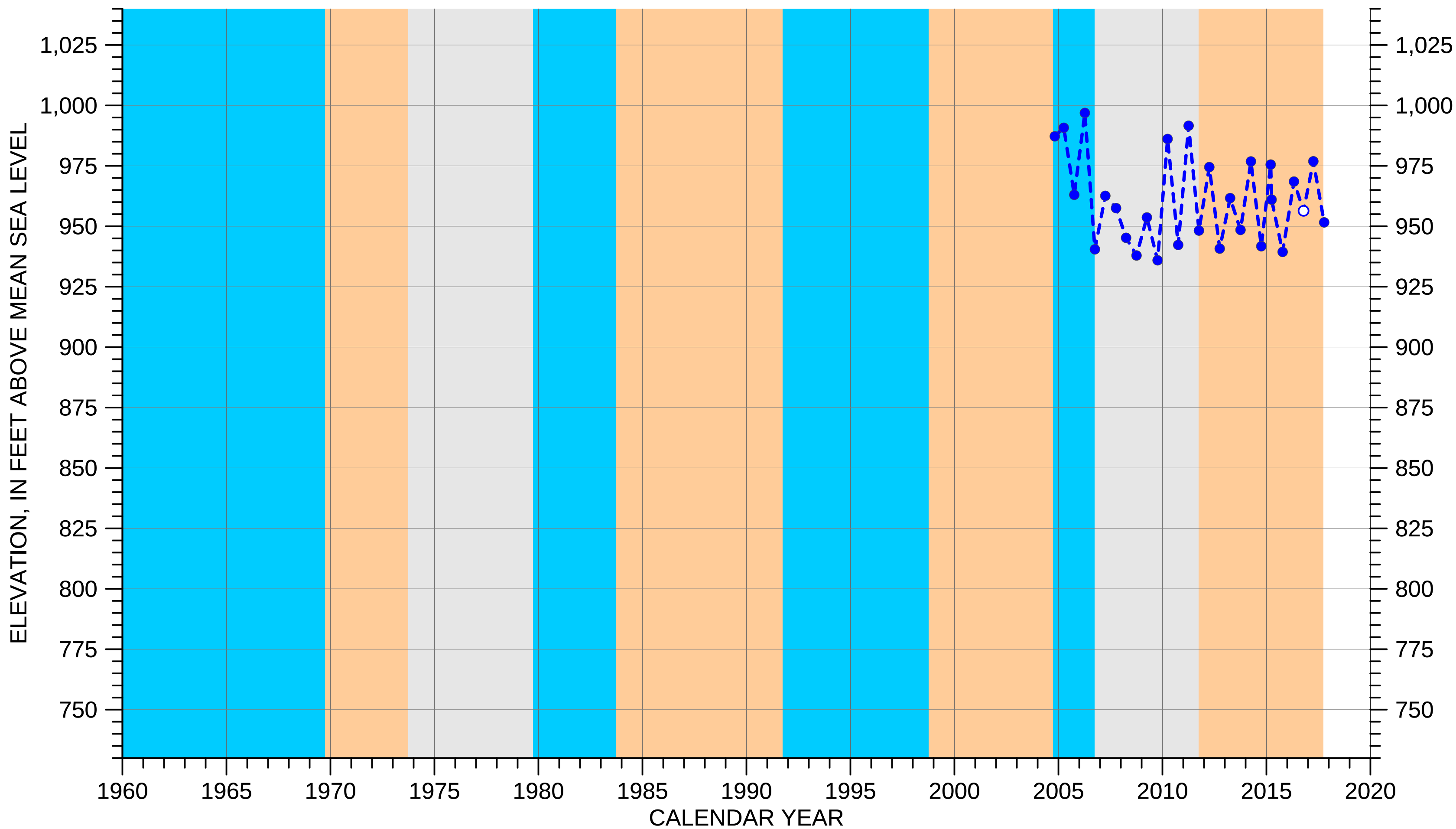
Well Depth: 461 feet
Screened Interval: 297-461 feet below ground surface
Reference Point Elevation: 1036.36 feet above mean sea level

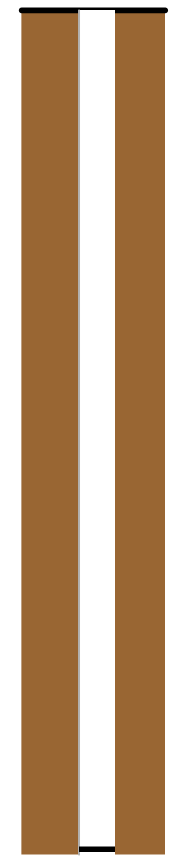
* Measurement reported as not static

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 26S/15E-20B04

MONTGOMERY & ASSOCIATES

S:\projects\9200_Paso Robles GSP\SMC\Data\Figures\Hydrographs\grf\AppendixC\Fig12_26S_15E-20B04.grf





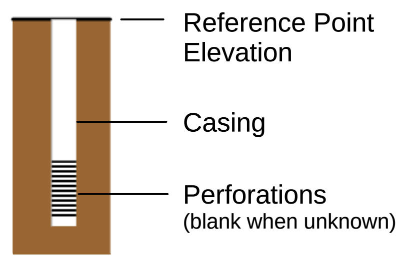
EXPLANATION

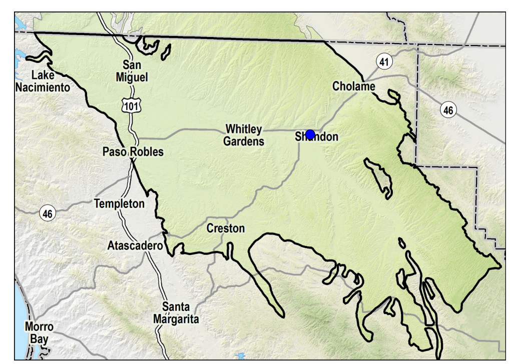
GROUNDWATER ELEVATION

MEASUREMENT NOT VERIFIED*

CLIMATE PERIOD CLASSIFICATION

DRY | AVERAGE/ALTERNATING | WET





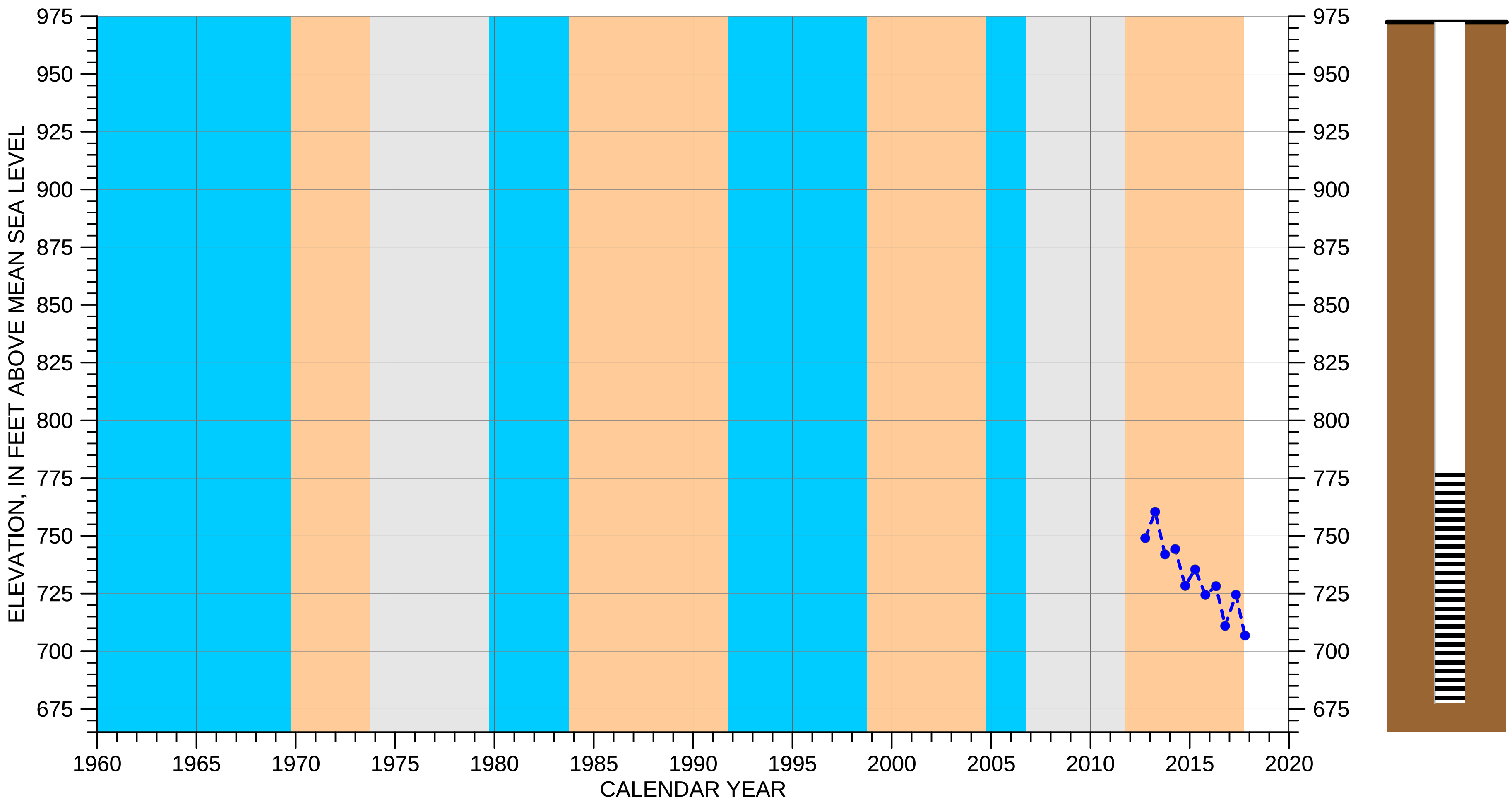
Well Depth: 440 feet
Screened Interval: 300-320, 340-380, 400-440 feet below ground surface
Reference Point Elevation: 1032.9 feet above mean sea level

* Measurement reported as not static

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 26S/15E-20B05

MONTGOMERY & ASSOCIATES

S:\projects\9200_Paso Robles GSP\SMC\Data\Figures\Hydrographs\grf\AppendixC\Fig13_26S_15E-20B05.grf



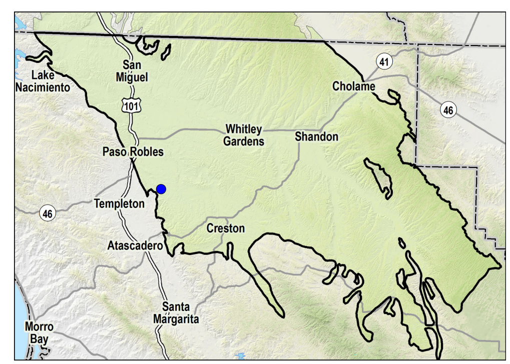
EXPLANATION

GROUNDWATER ELEVATION

MEASUREMENT NOT VERIFIED*

CLIMATE PERIOD CLASSIFICATION

DRY   AVERAGE/ALTERNATING   WET



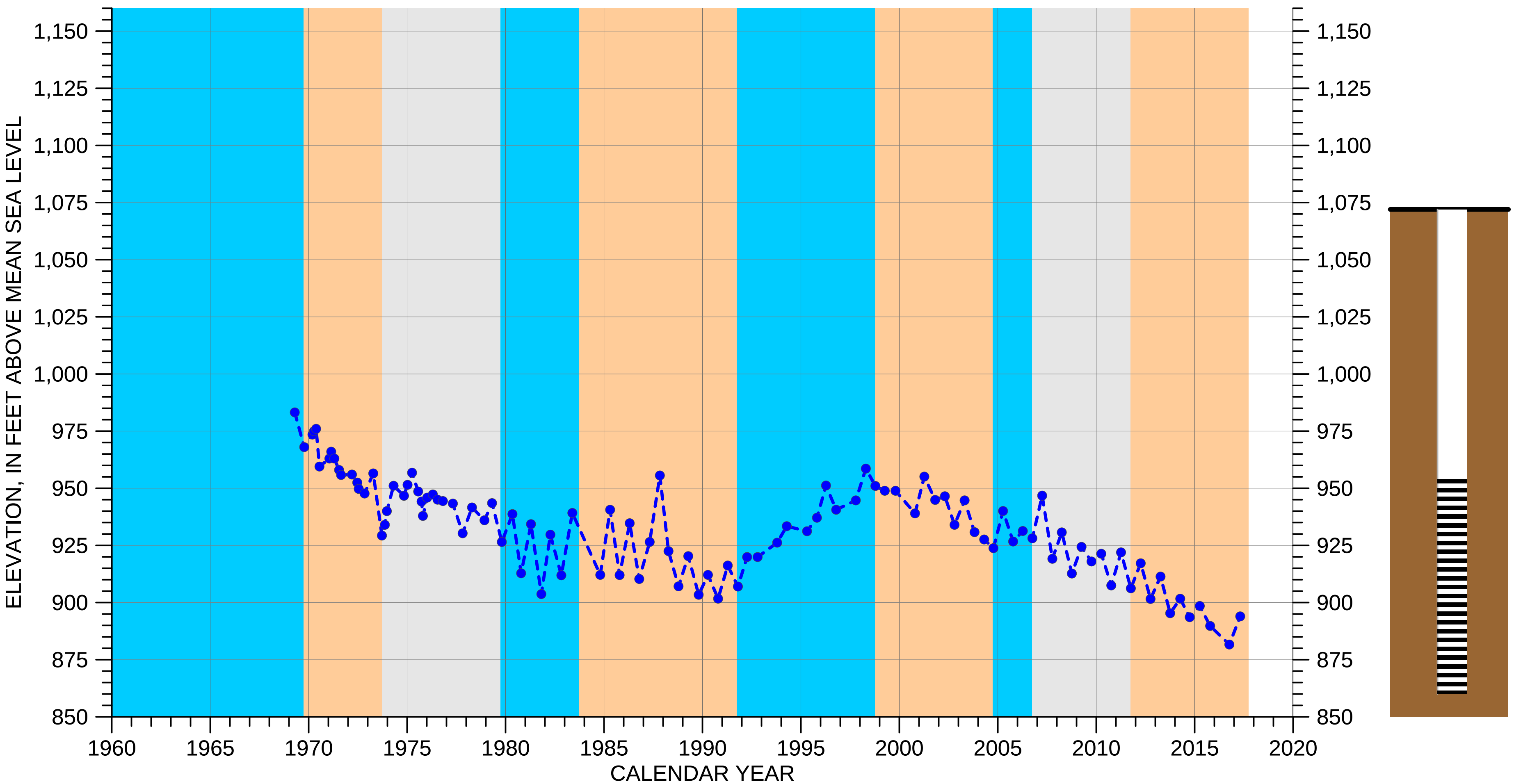
Well Depth: 295 feet
Screened Interval: 195-295 feet below ground surface
Reference Point Elevation: 972.4 feet above mean sea level

* Measurement reported as not static

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 27S/12E-13N01

MONTGOMERY & ASSOCIATES

S:\projects\9200_Paso Robles GSP\SMC\Data\Figures\Hydrographs\grf\AppendixC\Fig14_27S_12E-13N01.grf



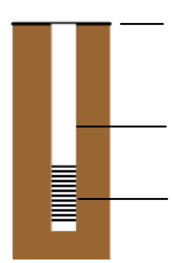
EXPLANATION

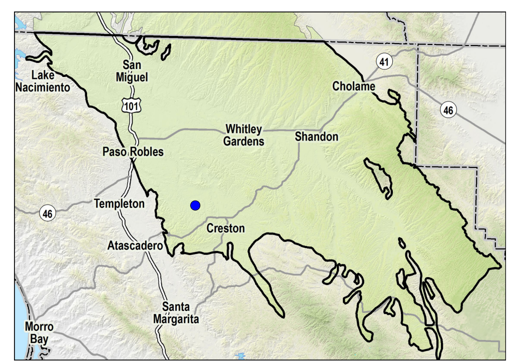
GROUNDWATER ELEVATION

MEASUREMENT NOT VERIFIED*

CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET





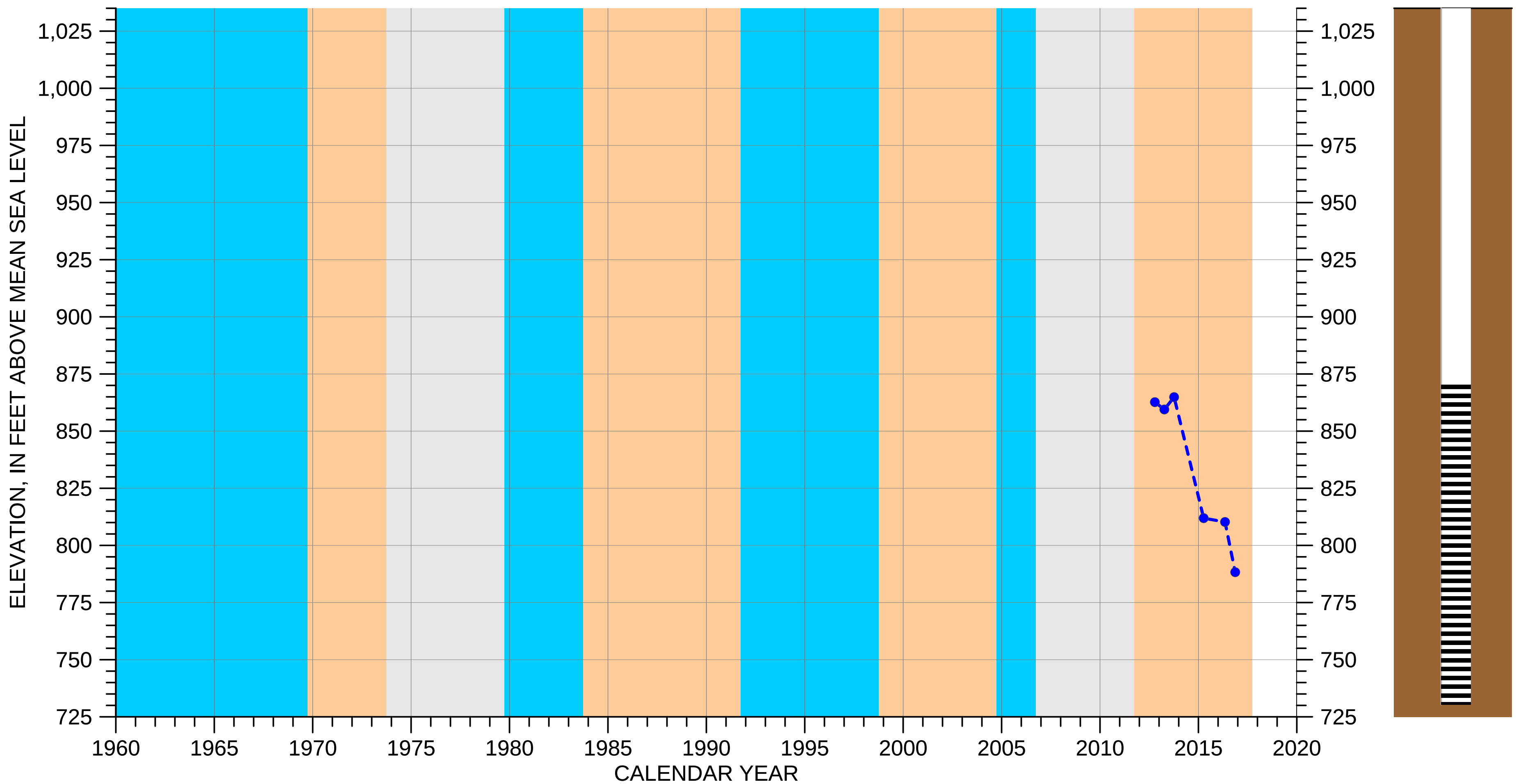
Well Depth: 212 feet
Screened Interval: 118-212 feet below ground surface
Reference Point Elevation: 1072 feet above mean sea level

* Measurement reported as not static

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 27S/13E-28F01

MONTGOMERY & ASSOCIATES

S:\projects\9200_Paso Robles GSP\SMC\Data\Figures\Hydrographs\grf\AppendixC\Fig15_27S_13E-28F01.grf



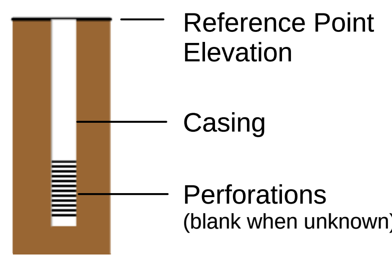
EXPLANATION

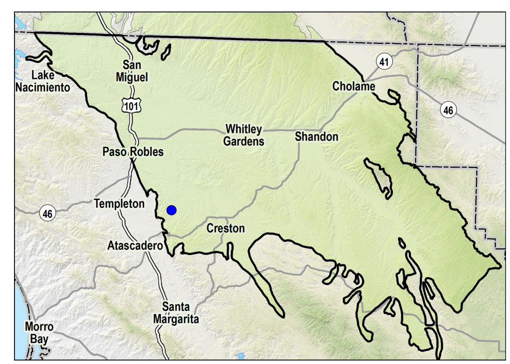
GROUNDWATER ELEVATION

MEASUREMENT NOT VERIFIED*

CLIMATE PERIOD CLASSIFICATION

DRY | AVERAGE/ALTERNATING | WET





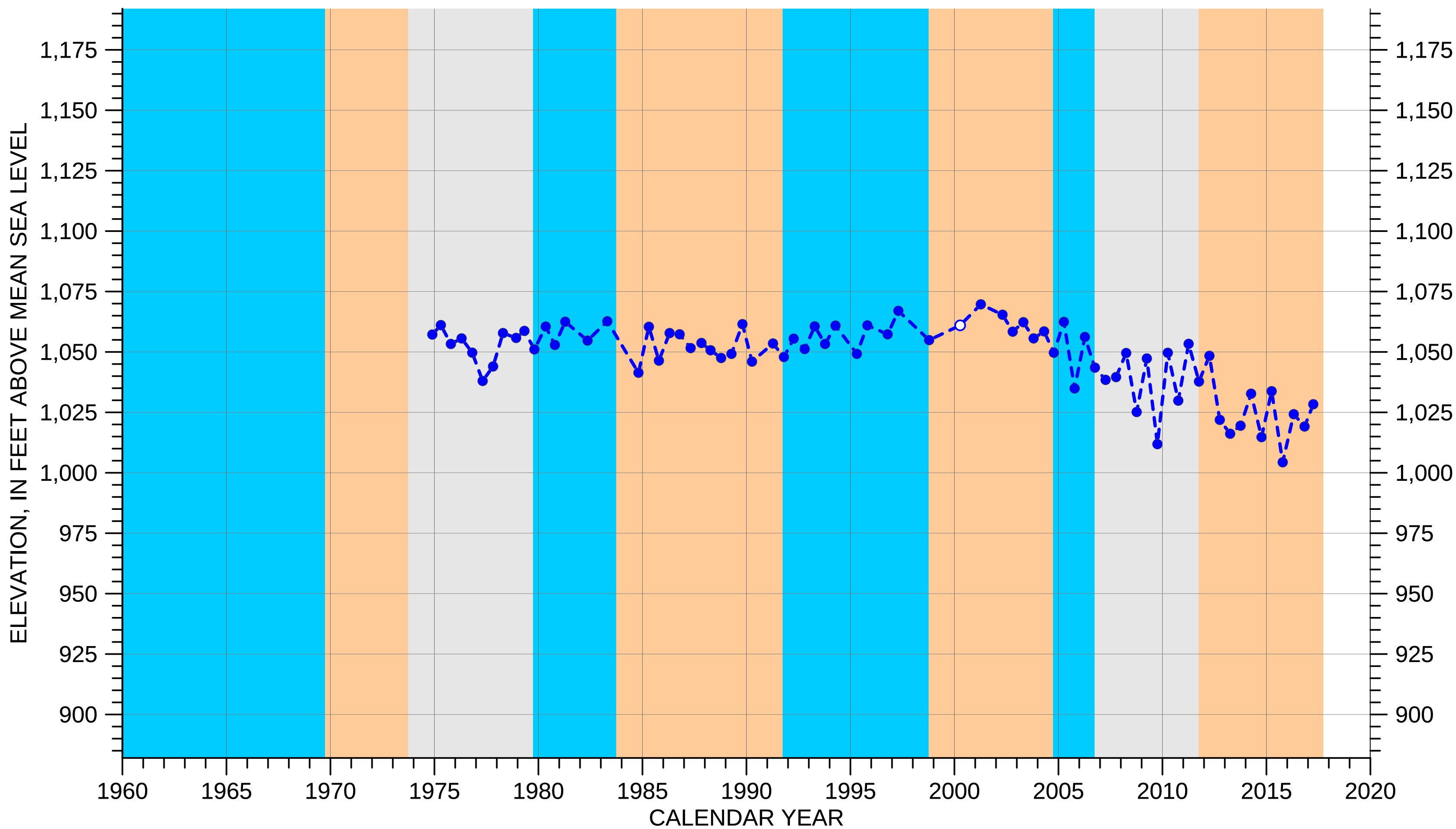
Well Depth: 355 feet
Screened Interval: 215-235, 275-355 feet below ground surface
Reference Point Elevation: 1086.7 feet above mean sea level

* Measurement reported as not static

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 27S/13E-30N01

MONTGOMERY & ASSOCIATES

S:\projects\9200_Paso Robles GSP\SMC\Data\Figures\Hydrographs\grf\AppendixC\Fig16_27S_13E-30N01.grf



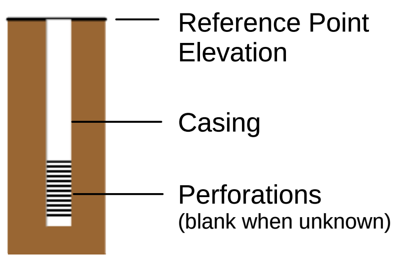
EXPLANATION

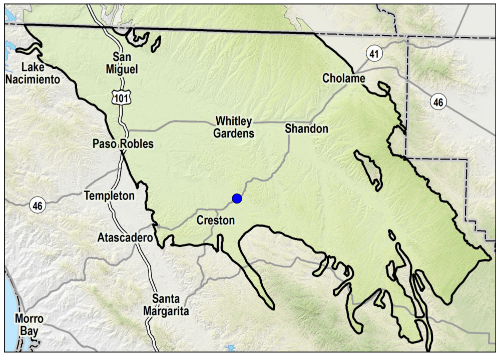
GROUNDWATER ELEVATION

MEASUREMENT NOT VERIFIED*

CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET





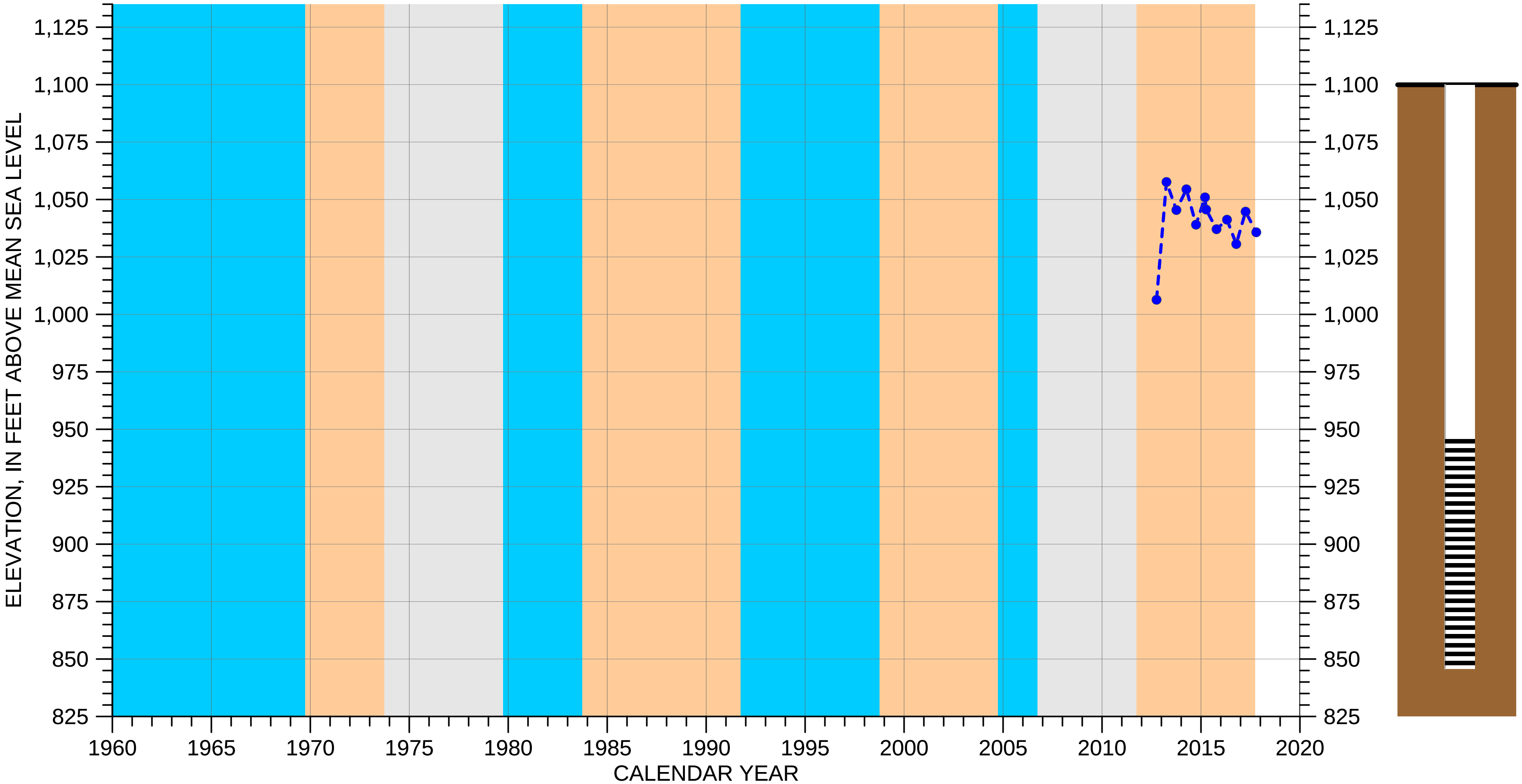
Well Depth: Lower Paso Robles Formation (GSSI, 2016)
Screened Interval: unknown
Reference Point Elevation: 1201.5 feet above mean sea level

* Measurement reported as not static

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 27S/14E-29G01

MONTGOMERY & ASSOCIATES

S:\projects\9200_Paso Robles GSP\SMC\Data\Figures\Hydrographs\grf\AppendixC\Fig17_27S_14E-29G01.grf



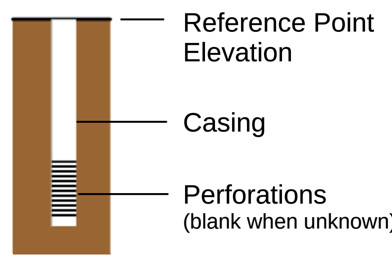
EXPLANATION

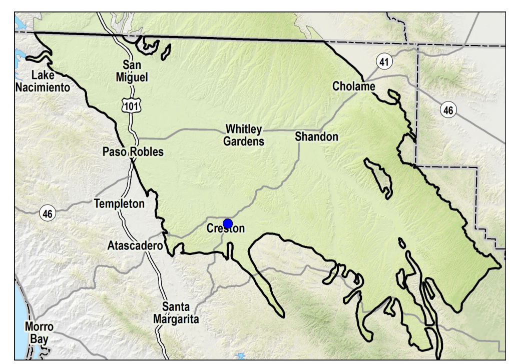
GROUNDWATER ELEVATION

MEASUREMENT NOT VERIFIED*

CLIMATE PERIOD CLASSIFICATION

DRY | AVERAGE/ALTERNATING | WET





Well Depth: 254 feet
Screened Interval: 154-254 feet below ground surface
Reference Point Elevation: 1099.9 feet above mean sea level

* Measurement reported as not static

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 28S/13E-01B01

MONTGOMERY & ASSOCIATES

S:\projects\9200_Paso Robles GSP\SMC\Data\Figures\Hydrographs\grf\AppendixC\Fig18_28S_13E-01B01.grf

Appendix D. Summary of Model Update and Modifications

LIST OF FIGURES

LIST OF TABLES

D1 INTRODUCTION

This appendix briefly summarizes modeling work done for the GSP. A hydrologic modeling platform was developed for the Paso Robles Subbasin during the period from 2005 through 2016. This modeling platform was adapted for the GSP. Modeling work conducted for the GSP included the following activities:

- Updating the platform with recent hydrologic information
- Modifying certain components of the platform to address computational issues identified during the update process
- Adapting the water budgeting process to be consistent with the new boundary of the Paso Robles Subbasin[1]. Figure D-1 of the GSP shows the new Subbasin Boundary (in green); the GSP only applies to the new Subbasin area, thus, water budgets reported in the GSP do not include areas within the former Subbasin boundary that lie north of the San Luis Obispo County Line and do not include the Atascadero Subbasin. Therefore, groundwater budgets reported in the GSP are not directly comparable to previously reported groundwater budgets.

[1] The Subbasin boundary was formally modified by the California Department of Water Resources on February 11, 2019. Information on the modified boundary can be found at https://water.ca.gov/Programs/Groundwater-Management/Basin-Boundary-Modifications.

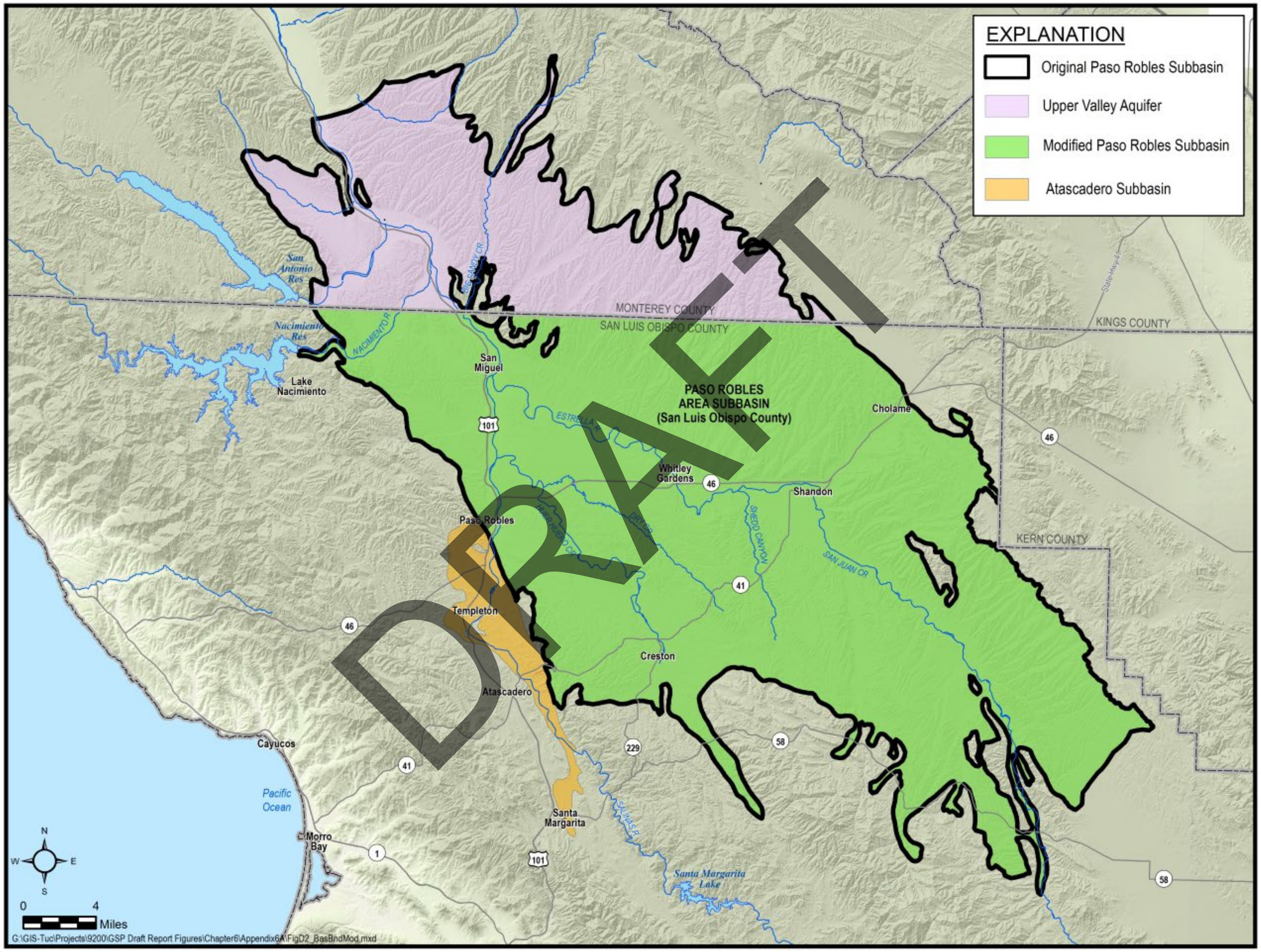


Figure D-1. Map Showing Paso Robles Subbasin Boundary

This appendix summarizes the model update process and effects of changes to the modeling platform and the change in Subbasin boundary on computed groundwater budgets, and presents a comparison between previously reported groundwater budgets and the computed groundwater budget for the GSP.

The appendix is subdivided into the following sections.

- Description of GSP Model
- Model Update
- Model Modifications
- Comparison of Groundwater Budgets

The hydrologic modeling platform includes a numerical groundwater flow model and two additional models that are used to compute groundwater model input data for streamflow, recharge, and groundwater pumping [Geoscience Support Services, Inc. (GSSI), 2014 and 2016]. The two additional models consist of a Soil Water Balance (SWB) spreadsheet model and a surface water model. The interrelationship between the groundwater model, SWB model, and surface water model are shown on Figure D-2. Hereafter in this appendix, the original hydrologic modeling platform developed by GSSI is referred to as "the GSSI model."

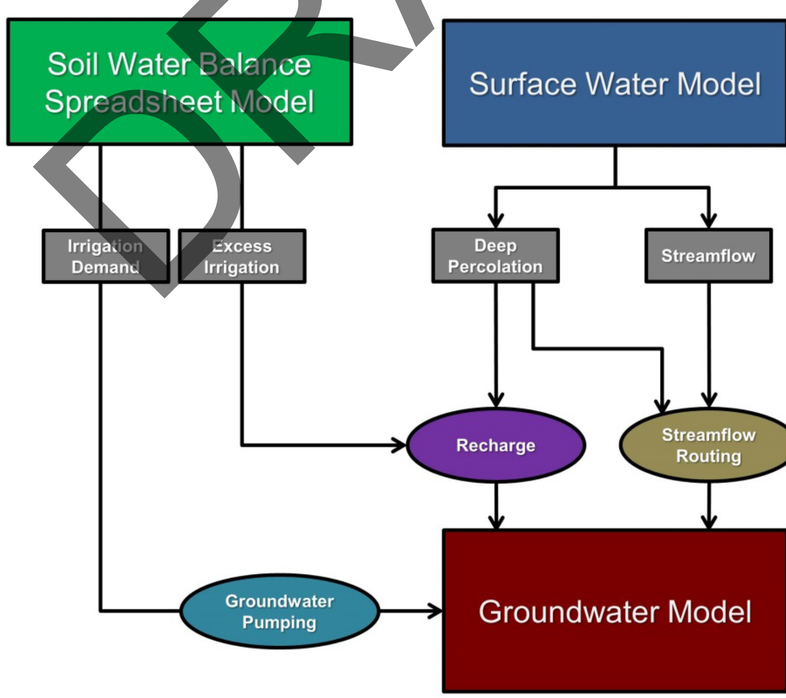


Figure D-2. Schematic for Modeling Platform

The GSSI model was updated for the GSP. The model update process included compiling hydrologic data and preparing model input files to extend the simulation time period from 2012 through 2016. Model modifications included changes to model structure, input/output processing routines, and model assumptions. Modifications were made to address issues that had a potentially significant impact on the computed water budget and groundwater storage deficit. These modifications were made to develop an updated estimate of the groundwater storage deficit that must be addressed during implementation of the GSP.

As was planned from the outset of GSP development, and to meet critical deadlines, the GSP model was not recalibrated. In lieu of recalibration, a focused comparison of model-projected and observed groundwater elevations at wells and stream flows at selected stream gages was conducted. Results of this comparison indicated that the calibration of the GSP model was similar to the GSSI model, thus, the model was considered appropriate for use on the GSP. The GSP model will be recalibrated in the future when additional hydrogeologic data are available.

D1.1 Overview of Differences in Computed Sustainable Yield

Previous and current estimates of sustainable yield of the Subbasin were computed using the modeling platform. Both the model modifications and the change in Subbasin boundary influence the computed sustainable yield. Over the historical base period from 1981 through 2011, the computed sustainable yield from the 2016 GSSI model is about 89,700 acre-feet per year (AFY). This estimate of sustainable yield pertains to the original Subbasin boundary and the Atascadero Subbasin. By comparison, the computed sustainable yield for the modified Subbasin boundary from the updated GSP model is about 59,800 AFY. The difference between these two values is nearly 30,000 AFY. About 80% of this difference is due to changes in the Subbasin boundary. The remaining difference is the result of modifications made to the model components.

D2 DESCRIPTION OF GSP MODEL

D2.1 Soil Water Balance Spreadsheet Model

The SWB model uses rainfall, evapotranspiration, soil, and crop data to estimate groundwater irrigation demand for crops in the Subbasin. Irrigated crops in the Paso Robles Subbasin are assigned to seven crop categories (Carollo and others, 2012), including alfalfa, nursery, pasture, citrus, deciduous, vegetables, and vineyard. For the GSP model, geospatial crop datasets compiled by the Agricultural Commissioner's Office of San Luis Obispo County were intersected with different climate zones and soil types in both the Paso Robles Subbasin and surrounding watershed. For each of the seven crop categories, existing discrete SWB models were extended in time for each unique intersection of crop acreage, climate zone, and soil type to cover the current period (2012-2016).

The underlying structure and data requirements are identical for all of the SWB spreadsheet models, except vineyards. All of the SWB models operate on a daily time step, and require daily precipitation and reference evapotranspiration rates as input. SWB models developed for vineyards also require daily minimum temperature data to estimate frost prevention groundwater pumping during March and April.

The SWB model computes daily irrigation demand rates in inches. Groundwater pumping to satisfy the irrigation demand is higher than the actual crop demand due to excess irrigation losses, which depend on assumed irrigation efficiency. The study documented by GSSI (2014) defined irrigation efficiency for each of the seven crop categories, and those efficiency values were also used in this study. The difference between groundwater pumping and crop irrigation demand is assumed to percolate past the base of the root zone, ultimately becoming groundwater recharge. This recharge is referred to as irrigation return flow in Chapter 6.

D2.2 Surface Water Model

A surface water model was developed by GSSI (2014) for the watershed contributing to the Paso Robles Subbasin. The surface water model was developed using the Hydrologic Simulation Program – Fortran (HSPF) code. The model simulates land surface processes and surface water flow at the subwatershed scale (Bicknell and others, 2001). The surface water model simulates daily time steps, and requires daily precipitation, reference evapotranspiration, and reservoir releases as input. Historical watershed simulations developed by GSSI (2014) used land use data for 1985, 1997, and 2011 in the surface water model. The 2011 land use data were used to update the GSP model.

The surface water model simulates deep percolation of precipitation past the base of the root zone and streamflow leaving the outlet of each subwatershed. The amount of deep percolation of precipitation computed by the surface water model was included in the recharge assigned to the groundwater model, and simulated streamflow at the subwatershed outlet was used to compute surface flow rates for stream segments simulated in the groundwater model.

D2.3 Groundwater Model

The groundwater flow model for the Paso Robles Subbasin uses the MODFLOW-2005 code (GSSI, 2014 and 2016). The extent and structure of the GSSI model are based on an earlier version of the groundwater flow model developed by Fugro (2005). Groundwater inflows simulated in the model include areal recharge, subsurface inflow at the model boundaries, and streambed percolation. Areal recharge includes both recharge from precipitation and irrigation return flow. Groundwater outflows simulated in the model include subsurface flow out of the Subbasin, groundwater pumping, and riparian evapotranspiration.

Areal recharge and subsurface inflow are computed based on excess irrigation from the SWB model and deep percolation of precipitation from the surface water model. Streambed percolation depends on both simulated water table elevation and simulated streamflow, which in turn is based on simulated streamflow from the surface water model. Agricultural groundwater pumping is specified based on irrigation demand computed in the SWB model.

D3 MODEL UPDATE

SGMA regulations require estimation of surface water and groundwater budgets for both a historical base period and current period. For the Subbasin, the historical base period covers Water Years (WY) 1981 through 2011 and the current period covers WY 2012 through 2016. The existing model covers only the historical base period (GSSI, 2014; GSSI, 2016). To comply with SGMA regulations for developing a current water budget, it was necessary to update the 2016 version of the GSSI model to include hydrologic data from 2012 through 2016.

Each of the three components of the modeling platform was updated to include the current period. Table D-1 lists datasets used for the model update, along with the source for each dataset.

Table D-1. Data Sources for Model Update

Dataset	Responsible Agency or Entity	Type of Data	Data Source
Meteorological Data			
Paso Robles Station (46730); Santa Margarita Booster Station (47933)	NOAA[1]	Daily precipitation	https://www.ncdc.noaa.gov/cdo-web/datatools/findstation
San Miguel Wolf Ranch (47867)	NOAA[1]	Daily precipitation	ftp://ftp.ncdc.noaa.gov/pub/data/hpd/auto/v2/beta/
Oak Shores WWTP (201)	San Luis Obispo County	Daily precipitation	Electronic transmittal from SLO County
Paso Robles	WWG[2]	Daily reference evapotranspiration	Electronic transmittal
Atascadero (163)	CIMIS[3]	Daily reference evapotranspiration	https://cimis.water.ca.gov/WSNReportCriteria.aspx
Hydrologic Data			
Nacimiento Reservoir	Monterey County Water Resources Agency	Daily reservoir releases	http://www.co.monterey.ca.us/government/government-links/water-resources-agency/projects-facilities/historical-data#wra
San Antonio Reservoir	Monterey County Water Resources Agency	Daily reservoir releases	http://www.co.monterey.ca.us/government/government-links/water-resources-agency/projects-facilities/historical-data#wra
Salinas Dam	San Luis Obispo County	Daily reservoir releases	https://wr.slocountywater.org/site.php?site_id=25&site=2d50a617-2e23-4efc-a9be-e3a2c4a7100b
Water Use Data			
San Miguel CSD	San Miguel CSD	Monthly groundwater pumping	Excel file (Paso_Water_Use_Tables_v7.xlsx) received from GEI Consultants on 14 June 2018; data provided to GEI by San Miguel CSD
City of Paso Robles	City of Paso Robles	Monthly groundwater pumping	Excel file (Paso_Water_Use_Tables_v7.xlsx) received from GEI Consultants on 14

			June 2018; data provided to GEI by City of Paso Robles
Templeton CSD	Templeton CSD	Annual groundwater pumping	Water Supply Buffer Update, January 31, 2018
Atascadero MWC	Atascadero MWC	Annual groundwater pumping	Atascadero MWC Urban Water Management Plan
Small commercial pumping	N/A	Annual groundwater pumping	For pumping that started before 2010, projected based on historic use in 2016 model (linear regression trend). For water use that began in 2010; assume 1% annual increase through 2016.
Domestic pumping	N/A	Annual groundwater pumping	Projected based on historic use in 2016 model (linear regression trend).
Agricultural pumping	N/A	Annual groundwater pumping	Pumping based on groundwater demand from soil water-balance spreadsheets
Wastewater Recharge			
Wastewater recharge (all utilities)	N/A	Annual recharge to groundwater from wastewater	Projected based on rates in 2016 model (linear regression trend).
Crop Data			
San Luis Obispo County, 2013-2016	San Luis Obispo County	Geospatial data attributed with acreage and crop group	Electronic transmittal from SLO County
State of California, 2014	CA DWR[4]	Geospatial data attributed with acreage and crop group	https://gis.water.ca.gov/app/CADWRLandUseViewer/

(1) National Oceanic and Atmospheric Administration

(2) Western Weather Group

(3) California Irrigation Management Information System

(4) California Department of Water Resources

D4 MODEL MODIFICATIONS

D4.1 Modifications to Model Components

Groundwater budgets for the Subbasin were derived from the groundwater flow model, which depends on the SWB models and surface water model for key input data. During the model update process for the GSP model, several modifications were made to the individual models to improve two computational aspects of the model.

D4.1.1 Modifications to Agricultural Irrigation Routing

In the model input files developed by GSSI and provided to Montgomery & Associates (M&A) by the County of San Luis Obispo, irrigation return flow was routed to the surface water model. This irrigation return flow was treated as an external lateral surface inflow to the land surface. The surface water model combines this water with all direct precipitation that was not intercepted by the crop canopy. Some of the water accumulating at the land surface becomes streamflow. The remaining water enters the soil root zone. In the GSSI model, excess irrigation return flow water accumulating in the upper and lower soil root zones was subject to evapotranspiration. However, excess irrigation return flow represents water that has moved past the root zone, and should not be subject to evapotranspiration. Thus, irrigation return flow was inadvertently subjected to soil evaporation twice. The net effect of double-counting soil evaporation was to underestimate the quantity of water that ended up as deep percolation to groundwater.

The models were modified so that irrigation return flow calculated in the SWB models was routed to groundwater recharge in the groundwater flow model instead of routed to the surface water model. As a result, areal recharge specified in the GSP model is greater than areal recharge specified in the GSSI model.

D4.1.2 Modifications to Streamflow Routing Outside the Paso Robles Subbasin

In the GSSI model, subsurface inflow was computed as the sum of irrigation return flow, deep percolation of direct precipitation, and streambed percolation occurring outside the Subbasin boundaries. Streambed percolation was computed by HSPF as an outflow from each stream reach. The streambed percolation was computed using reference information from the HSPF Best Management Practices toolkit developed by the U.S. Environmental Protection Agency (GSSI, 2014).

Modifications were made to the process described above to ensure consistency in the simulated water balance. In HSPF, stream outflows and streambed percolation are routed to the next downstream stream reach. Consequently, when a stream enters the margin of the Paso Robles

Subbasin, HSPF routes all of the streamflow and streambed percolation into the stream network within the Subbasin. However, in the GSSI model, the streambed percolation water was also being added to the groundwater model as subsurface inflow. This means percolating water through streambeds in the watershed outside of the Subbasin was being double counted: as both stream inflow and subsurface inflow.

To avoid double counting the inflow, M&A modified the groundwater model input files so that subsurface inflow no longer included HSPF model-computed streambed percolation outside the Paso Robles, Atascadero, and Upper Valley Subbasins. The primary effect of this change was a reduction in subsurface inflow into the groundwater model. A secondary effect of this change was a reduction in inflow to streams inside the Subbasin boundary due to excess subsurface inflow.

Reduction in stream inflows as a result of modifications described above is due to an input processing procedure developed by GSSI (2016). Specifically, the 2016 version of the GSSI model included an empirical procedure for re-assigning computed subsurface inflow above a threshold value as surface water inflow to streams inside the Subbasin boundaries. The GSP model uses the same procedure; however, streambed percolation is no longer double counted, thus computed subsurface inflow in excess of the threshold is lower in the GSP model than compared to the GSSI (2016) model.

D4.1.3 Summary of Effects of Model Modifications

The net effect of correcting excess agricultural irrigation routing was to increase areal recharge within the Paso Robles Subbasin. The net effect of removing streambed percolation computed by the surface water model from subsurface inflow to the groundwater model was to reduce both subsurface inflow and surface water inflow to streams in the groundwater flow model. The combined effect of these two modifications was to reduce the amount of water recharging the groundwater system in the Subbasin.

D4.2 Change in Subbasin Boundary

The boundary of the Paso Robles Subbasin changed between completion of the 2016 GSSI model and the GSP model update.

In 2018, the California Department of Water Resources (DWR) redefined the Paso Robles Subbasin boundary in response to two basin boundary modification requests. As a result of this modification, the Atascadero Subbasin, and all land north of the Monterey County line are no longer included in the Paso Robles Subbasin (Figure D-1). The modified Subbasin area (in green) is addressed in the GSP. Groundwater budgets for the GSP are reported for the smaller Subbasin area. Previous groundwater budgets using the 2016 GSSI model were reported for the entire original Paso Robles Groundwater Subbasin, including the Atascadero Subbasin (GSSI, 2016). Therefore, the GSP groundwater budgets are not directly comparable to the previous groundwater budgets.

D5 COMPARISON OF GROUNDWATER BUDGETS

Differences between previously published groundwater budgets and the groundwater budget published in the GSP are caused by:

- Modifications made to the modeling platform components
- Changes in the Subbasin boundary

These changes have a direct effect on the computed water budget, long-term groundwater storage deficit and sustainable yield in the Subbasin.

The effect of modifying the modeling platform on groundwater storage deficit and sustainable yield can be quantified by comparing the computed water budgets from 2016 GSSI and GSP models for the same Subbasin boundary. The effect of changing the Subbasin boundary on groundwater storage deficit and sustainable yield can be quantified by comparing the computed groundwater budget of the original Paso Robles Subbasin boundary to the groundwater budget of the modified Paso Robles Subbasin boundary using either the 2016 GSSI or GSP model.

D5.1 Effect of Model Modifications on Water Budgets

This section summarizes changes in water budget components, groundwater storage deficit, and sustainable yield that result from modifications made to the individual models of the modeling platform. Table D-2 compares annual average groundwater pumping rates by water use sector for the historical base period (1981 to 2011) specified for the original Paso Robles Subbasin boundary in the GSSI (2016) and GSP models.

Table D-2. Simulated Groundwater Pumping

	Original Subbasin Boundary	
Water Use Sector	GSSI (2016)	GSP model
Agricultural	75,900	75,800
Municipal	12,000	12,000
Rural-Domestic	2,800	2,800
Small Commercial	2,200	2,200
Total	92,900	92,800

Note: All values in AFY

Annual average groundwater pumping rates are nearly identical between the two models. The small increase of 100 AFY in annual average agricultural pumping in the GSP model is the result of minor modifications made to the model data processing spreadsheets.

Table D-3 compares simulated annual average inflow and outflow components of the groundwater budget for the original Paso Robles Subbasin boundary for the historical base period for the GSSI (2016) and GSP models.

Table D-3. Comparison of Annual Average Inflow and Outflow Components

	Original Subbasin Boundary	
	GSSI (2016)	GSP model
Inflow		
Streamflow Percolation	53,000	39,500
Total Recharge[1]	50,500	51,600
Treated Wastewater Leakage	5,600	5,600
Total Inflow	109,100	96,700
Outflow		
Groundwater Pumping	92,900	92,800
Discharge to Streams and Rivers	14,300	13,200
Riparian Evapotranspiration	3,500	3,500
Subsurface Outflow [2]	1,600	1,600
Total Outflow	112,300	111,100

Notes: All values in AFY

(1) Includes areal recharge and subsurface inflow from the surrounding watershed

(2) Includes subsurface outflow in the Salinas Alluvium and Paso Robles Formation at the northern boundary of the original Paso Robles Subbasin

Total inflow in the GSP model is about 12,400 AFY lower than the GSSI (2016) model for the original Subbasin boundary. The reduction in total inflow reflects the net change in inflow caused by a reduction of 13,500 AFY in streambed percolation and an increase of 1,100 AFY in total recharge. The changes in streamflow and recharge are described in Section D-D4.1.

Table D-4 compares the computed annual average groundwater storage deficit and sustainable yield from the GSSI (2016) and GSP models, for the original Subbasin boundary and historical base period of 1981 through 2011.

Table D-4. Annual Average Groundwater Storage Deficit and Sustainable Yield

	Original Subbasin Boundary	
	GSSI (2016)	GSP model
Storage Deficit	3,200	14,400
Sustainable Yield	89,700	78,400

Note: All values in AFY

The computed annual average storage deficit for the original Subbasin boundary for the GSP model is about 11,200 AFY greater than the GSSI (2016) model. The increase in the computed storage deficit is due almost entirely to the reduction in total groundwater inflows, as shown in Table D-3. The reduction in total inflow is the result of the reduction in streamflow that resulted from modifying the model components. Consequently, the annual average sustainable yield of the original Subbasin boundary estimated using the GSP model is about 11,300 AFY lower than that computed by the GSSI model.

D5.2 Effect of Changes in Subbasin Boundary on Water Budgets

This section summarizes changes in water budget components, groundwater storage deficit, and sustainable yield that result from the change in Subbasin boundary. The 2016 GSSI model was used for this evaluation because it does not included the effect of modifications made to the model components discussed in Section D-D5.1. Table D-5 compares annual average groundwater pumping rates by water use sector specified for both the original and modified Subbasin boundaries, for the historical base period, and for the 2016 GSSI model.

Table D-5. Simulated Groundwater Pumping

	GSSI (2016) model	
Water Use Sector	Original Subbasin Boundary	Modified Subbasin Boundary
Agricultural	75,900	65,400
Municipal	12,000	3,100
Rural-Domestic	2,800	2,500
Small Commercial	2,200	1,400
Total	92,900	72,400

Note: All values in AFY

Simulated annual average total pumping rate is about 20,500 AFY lower for the modified Subbasin boundary compared to the original Subbasin boundary. The total amount of groundwater pumping is lower because pumping in the Atascadero Subbasin and the portion of the original Paso Robles Subbasin located in Monterey County is no longer accounted for in the modified Subbasin. Thus, the reduction in pumping is equivalent to the amount of groundwater pumping in the Atascadero Subbasin and in the portion of the original Paso Robles Subbasin located in Monterey County.

Table D-6 compares simulated annual average inflow and outflow components of the groundwater budget for the original and modified Subbasin boundaries, the historical base period, and the 2016 GSSI model.

Table D-6. Comparison of Simulated Inflow and Outflow

	GSSI (2016) model	
	Original Subbasin Boundary	Modified Subbasin Boundary
Inflow		
Streamflow Percolation	53,000	36,700
Total Recharge	50,500	34,000
Wastewater Pond Leakage	5,600	3,400
Subsurface Inflow [1]	0	3,600
Total Inflow	109,100	77,700
Outflow		
Groundwater Pumping	92,900	72,400
Discharge to Streams and Rivers	14,300	8,100
Riparian Evapotranspiration	3,500	1,700
Subsurface Outflow [2]	1,600	2,500
Total Outflow	112,300	84,700

Note: All values in AFY

(1) Subsurface inflow from the Atascadero Subbasin

(2) Subsurface outflow from the Paso Robles Subbasin to the Upper Valley Subbasin.

D5.2.1 Differences in Simulated Inflows

Total simulated annual average groundwater inflow is about 31,400 AFY lower for the modified Subbasin than the original Subbasin. The reduction reflects the net change in streamflow percolation, recharge, wastewater pond leakage, and subsurface inflow, as described further below.

- Simulated annual average streamflow percolation for the modified Subbasin boundary is about 16,300 AFY lower compared to the original Subbasin boundary. The lower streamflow percolation is due to reductions in the number and length of stream channels present within the modified Subbasin boundary compared to the original Subbasin boundary.
- Simulated annual average recharge for the modified Subbasin boundary is about 16,500 AFY lower compared to the original Subbasin boundary. The lower recharge is due to:
    - Smaller area within the modified Subbasin, resulting in less areal recharge from direct precipitation
    - Smaller area of irrigated fields within the modified Subbasin, resulting in less recharge from irrigation return flow

- Reduced length of contact between Subbasin and surrounding watershed, resulting in less subsurface inflow

- Simulated annual average wastewater pond leakage for the modified Subbasin boundary is about 2,200 AFY lower compared to the original Subbasin boundary. Wastewater pond leakage is lower because it does not include wastewater pond leakage within the Atascadero Subbasin.
- Simulated annual average subsurface inflow for the modified Subbasin boundary is about 3,600 AFY higher compared to the original Subbasin boundary. Subsurface inflow to the modified Subbasin includes groundwater flow from the Atascadero Subbasin into the Paso Robles Subbasin. When modeling the original Subbasin boundary, which includes both the Atascadero Subbasin and Paso Robles Subbasin, the flow between the Subbasins was an internal flow within the model and not an inflow crossing the boundary of the model.

D5.2.2 Differences in Simulated Outflows

Total simulated annual average outflow for the modified Subbasin boundary is about 27,600 AFY lower compared to the original Subbasin boundary. The reduction in total simulated outflow is due to changes in simulated discharge to rivers and streams, riparian evapotranspiration, and subsurface outflow, as described further below.

- Simulated annual average total groundwater pumping for the modified Subbasin is about 20,500 AFY lower than that of original Subbasin. The amount of groundwater pumping is lower because the modified Subbasin boundary does not include pumping from the Atascadero Subbasin or the portion of the original Paso Robles Subbasin in Monterey County.
- Simulated annual average discharge to streams and rivers for the modified Subbasin boundary is about 6,200 AFY lower compared to the original Subbasin boundary. The lower discharge to rivers and streams is due to exclusion of channel segments that receive groundwater discharge in the Atascadero Subbasin and portion of the original Paso Robles Subbasin in Monterey County.
- Simulated annual average riparian evapotranspiration for the modified Subbasin boundary is about 1,800 AFY lower compared to the original Subbasin boundary. The amount of riparian evapotranspiration is lower because the number and length of stream channels along which riparian vegetation are lower in the modified Subbasin compared to the original Subbasin.
- Simulated annual average subsurface outflow for the modified Subbasin boundary is about 900 AFY higher compared to the original Subbasin boundary. Similar to subsurface inflow, the higher subsurface outflow occurs because this flow crosses a

boundary (the Monterey County line) when modeling the modified Subbasin boundary, whereas, this flow is internally accounted for when modeling the original Subbasin boundary.

D5.2.3 Differences in Simulated Sustainable Yield

Table D-7 compares the computed average annual groundwater storage deficit and sustainable yield for the original and modified Subbasin boundaries, the historical base period, and using the 2016 GSSI model.

Table D-7. Average Annual Groundwater Storage Deficit and Sustainable Yield

	2016 GSSI Model	
	Original Subbasin	Modified Subbasin
Storage Deficit	3,200	7,000
Sustainable Yield	89,700	65,400

Note: All values in AFY

The computed annual average storage deficit from the 2016 GSSI model is about 3,200 AFY for the original Subbasin. Groundwater storage deficits similar to this value have been commonly reported in the Paso Robles Subbasin in the past. For the modified Subbasin, the computed annual average storage deficit from the 2016 GSSI model is about 7,000 AFY. Therefore, the computed annual average groundwater storage deficit for the modified Subbasin is about 3,800 AFY higher compared to the original Subbasin. The increase in computed annual average groundwater storage deficit is the result of differences in the magnitude of reductions in total inflow and total outflow.

Figure D-3 shows a map of computed sustainable yields from the 2016 GSSI model. The area of the original Paso Robles Subbasin outside of the modified Subbasin (green area) has been divided into the Atascadero Subbasin and the Upper Valley Aquifer Subbasin for illustration purposes. The sustainable yield of the Upper Valley Aquifer, Paso Robles, and Atascadero Subbasins shown on Figure D-3 sum to the sustainable yield of the original Subbasin as listed in Table D-7.

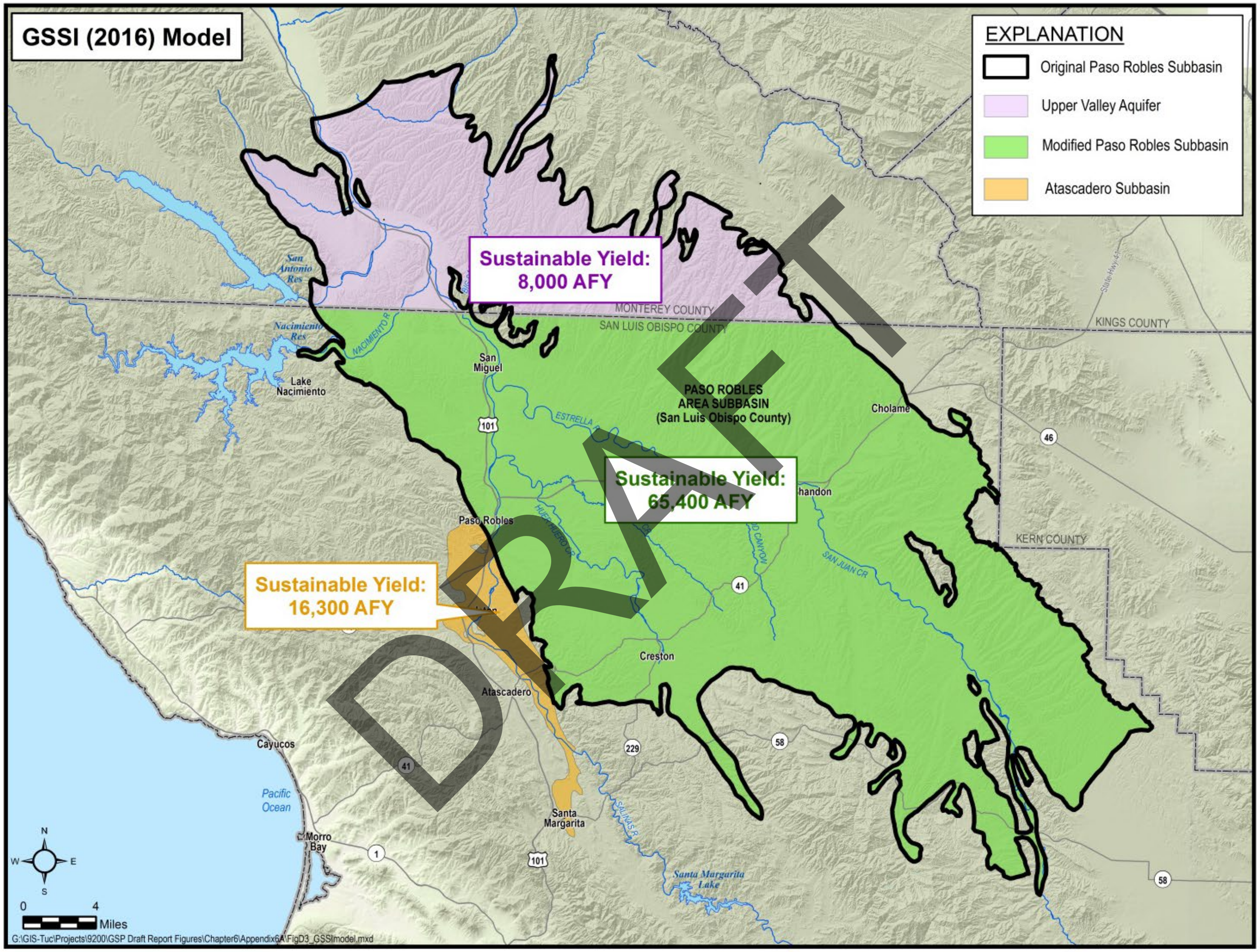


Figure D-3. Sustainable Yield Computed by GSSI (2016) Model

D5.3 Combined Effect of Model Modifications and Changes in Subbasin Boundary on Water Budgets

This section summarizes changes in water budget components, groundwater storage deficit, and sustainable yield that result from both modifications made to model components and the change the Subbasin boundary. For this evaluation, the GSP model was used because it includes both types of changes. Table D-8 compares annual average groundwater pumping rates by water use sector specified for both the original and modified Subbasin boundaries, for the historical base period, using the GSP model.

Table D-8. Simulated Groundwater Pumping for GSP Model

	GSP Model	
Water Use Sector	Original Subbasin	Modified Subbasin
Agricultural	75,800	65,400
Municipal	12,000	3,100
Rural-Domestic	2,800	2,500
Small Commercial	2,200	1,400
Total	92,800	72,400

Note: All values in AFY

Table D-9 compares simulated annual average inflow and outflow components of the groundwater budget for the original and modified Subbasin boundaries, for the historical base period, using the GSP model.

Table D-9. Comparison of Simulated Inflow and Outflow for GSP Model

	GSP model	
	Original Subbasin	Modified Subbasin
Inflow		
Streamflow Percolation	39,500	26,900
Total Recharge	51,600	38,000
Wastewater Pond Leakage	5,600	3,400
Subsurface Inflow[1]	--	3,100 [1]
Total Inflow	96,700	71,400
Outflow		
Groundwater Pumping	92,800	72,400
Discharge to Streams and Rivers	13,200	7,300
Riparian Evapotranspiration	3,500	1,700
Subsurface Outflow	1,600 [2]	2,600 [3]
Total Outflow	111,100	84,000

Note: All values in AFY

(1) Subsurface inflow from the Atascadero Subbasin

(2) Includes subsurface outflow in the Salinas Alluvium and Paso Robles Formation at the northern boundary of the original Paso Robles Subbasin

(3) Subsurface outflow from the Paso Robles Subbasin to the Upper Valley Subbasin.

D5.3.1 Differences in Simulated Inflows

Total simulated annual average groundwater inflow is about 25,300 AFY lower for the modified Subbasin than the original Subbasin. The reduction reflects the net change in streamflow percolation, recharge, wastewater pond leakage, and subsurface inflow, as described further below.

- Simulated annual average streamflow percolation for the modified Subbasin boundary is about 12,600 AFY lower compared to the original Subbasin boundary. The lower streamflow percolation is due to reductions in the number and length of stream channels present within the modified Subbasin boundary compared to the same for original Subbasin boundary.
- Simulated annual average recharge for the modified Subbasin boundary is about 13,600 AFY lower compared to the original Subbasin boundary. The lower recharge is due to:
    - Smaller area within the modified Subbasin, resulting in less recharge from direct precipitation
    - Smaller area of irrigated fields in the modified Subbasin, resulting in less recharge from irrigation return flow
    - Reduced length of contact between Subbasin and surrounding watershed, resulting in less subsurface inflow
- Simulated annual average wastewater pond leakage for the modified Subbasin boundary is about 2,200 AFY lower compared to the original Subbasin boundary. The amount of wastewater pond leakage is lower because the modified Subbasin does not include wastewater pond leakage within the Atascadero Subbasin.
- Simulated annual average subsurface inflow for the modified Subbasin boundary about 3,100 AFY higher compared to the original Subbasin boundary. Subsurface inflow to the modified Subbasin includes groundwater flow from the Atascadero Subbasin into the Paso Robles Subbasin. When modeling the original Subbasin boundary, which includes both the Atascadero Subbasin and Paso Robles Subbasin, the flow between the Subbasins is an internal flow within the model and not an inflow crossing the boundary of the modified Subbasin.

D5.3.2 Differences in Simulated Outflows

Total simulated annual average outflow for the modified Subbasin boundary is about 27,100 AFY lower compared to the original Subbasin boundary. The reduction in total simulated outflow is due to changes in simulated discharge to rivers and streams, riparian evapotranspiration, and subsurface outflow, as described further below.

- Simulated annual average total groundwater pumping for the modified Subbasin is reduced by about 20,400 AFY compared to the original Subbasin. The amount of groundwater pumping is lower because the modified Subbasin does not include pumping from the Atascadero Subbasin or the portion of the original Paso Robles Subbasin in Monterey County.
- Simulated annual average discharge to streams and rivers for the modified Subbasin boundary is about 5,900 AFY compared to the original Subbasin boundary. The amount of discharge to rivers and streams is lower because the modified Subbasin does not include channel segments that receive groundwater discharge in the Atascadero Subbasin and portion of the original Paso Robles Subbasin in Monterey County.
- Simulated annual average riparian evapotranspiration for the modified Subbasin boundary is about 1,800 AFY lower compared to the original Subbasin boundary. The amount of riparian evapotranspiration is lower because the modified Subbasin has fewer stream channels and shorter stream channel lengths along which riparian vegetation is present than the original Subbasin.
- Simulated annual average subsurface outflow for the modified Subbasin boundary is about 1,000 AFY higher compared to the original Subbasin boundary. Similar to subsurface inflow, the higher subsurface outflow occurs because this flow crosses a boundary (the Monterey County line) when modeling the modified Subbasin, whereas, this flow is internally accounted for when modeling the original Subbasin.

D5.3.3 Differences in Computed Sustainable Yield

Table D-10 compares the computed average annual groundwater storage deficit and sustainable yield for the original and modified Subbasin boundaries, the historical base period, and for the GSP model.

Table D-10. Average Annual Groundwater Storage Deficit and Sustainable Yield

	GSP Model	
	Original Subbasin	Modified Subbasin
Storage Deficit	14,400	12,600
Sustainable Yield	78,400	59,800

Note: All values in AFY

The computed annual average storage deficit from the GSP model is about 14,400 AFY for the original Subbasin boundary. For the modified Subbasin, the computed annual average storage deficit from the GSP model is about 12,600 AFY. Therefore, the computed annual average groundwater storage deficit for the modified Subbasin boundary is about 1,800 AFY lower compared to the original Subbasin boundary. The decrease in computed annual average groundwater storage deficit is the result of differences in the magnitude of reductions in total inflow and total outflow.

Figure D-4 shows a map of computed sustainable yields from the GSP model. The area of the original Paso Robles Subbasin outside of the modified Subbasin (green area) has been divided into the Atascadero Subbasin and the Upper Valley Aquifer Subbasin for illustration purposes. The sustainable yield of the Upper Valley Aquifer, Paso Robles, and Atascadero Subbasins shown on Figure D-4 sum to the sustainable yield of the original Subbasin as listed in Table D-10.

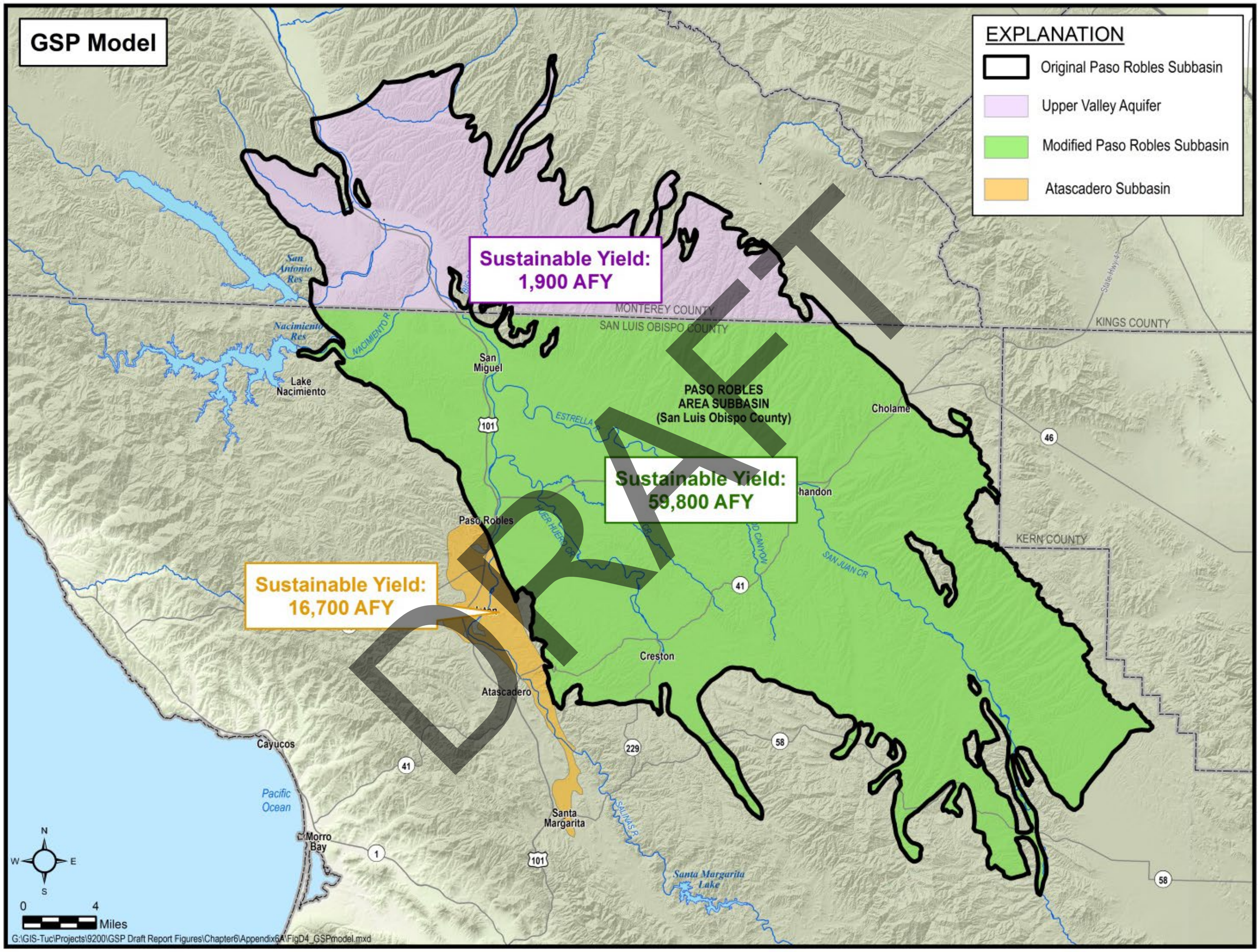


Figure D-4. Sustainable Yield as Computed by GSP Model

D6 CONCLUSIONS

Both the model modifications and the change in Subbasin boundary influence the computed sustainable yield. Over the historical base period, the computed sustainable yield for the original Subbasin boundary from the 2016 GSSI model is about 89,700 AFY. By comparison, the computed sustainable yield for the modified Subbasin boundary from the updated GSP model is about 59,800 AFY. The difference between these two values is nearly 30,000 AFY. Most of this difference is due to changes in the Subbasin boundary. The computed sustainable yield from 2016 GSSI model for the modified Subbasin boundary is 65,400 AFY; a reduction of about 24,300 AFY from the sustainable yield of the original Subbasin. The change in Subbasin boundary accounts for about 80% of the reduction in reported sustainable yields. The remaining difference is the result of modifications made to the model components.

APPENDIX E
MONITORING PROTOCOLS

County of San Luis Obispo Procedures for Measuring Depth to Water in Groundwater Wells

The following procedures must be followed when conducting depth to water measurements for the County of San Luis Obispo and the San Luis Obispo County Flood Control and Water Conservation District's groundwater monitoring program. These procedures are adapted from the USGS publication "Groundwater Technical Procedures of the U.S. Geological Survey" compiled by William L. Cunningham and Charles W. Schalk in 2011 and "Best Management Practices for the Sustainable Management of Groundwater – Monitoring Protocols, Standards and Sites" published by the California Department of Water Resources in December 2016.

Key Terms

1. RP (Reference Point): Total distance from the measuring point (typically the top of casing) to the surface of the water
2. WS: Length of wetted chalk on steel tape.
3. FT ABOVE: Distance from measuring point reference to land surface.
4. DIST to WATER: The distance from the measuring point to the water surface. RP – WS – FT ABOVE = DIST to Water.
5. OBS INIT: In the well book, note the initials of the person performing the measuring in this column. Determined by the login user on the iPad.
6. REMARKS or COMMENTS: Note any special remarks regarding the measurement of each well, including, any significant factors potentially affecting the well level, pumping or temporary blocked access, changes in RP, etc.
7. PUMPING: Fill the pumping column according to the Pumping Key Legend
    a. D = Dry
    b. E = Estimated
    c. F = Flowing
    d. N = Nearby pumping
    e. R = Recently pumped
    f. S = See well book
    g. T = Temporarily no access

Preparation

1. Groundwater elevation data, which will form the basis of basin-wide water table and piezometric maps, should approximate conditions at a discrete period in time. Therefore, all groundwater levels in a basin should be collected within as short a time as possible, preferably within a **1 to 2-week period**.
2. Check well log books for notifications about **one week** before you begin performing the bi-annual well measuring.
    a. Go through all the well data log books to check which wells have a special note of notifying owner. Make sure you contact the owners in accordance with the instructions.
    b. This information is also listed by well data book here: G:\WR\Tech Unit\x Groundwater\Well Information Resources\Well Books\Well Number Lists.
3. Verify the description of the well using the field iPad GIS program.

   a. You must ensure that you are measuring the correct well by comparing it to the iPad GIS and well book as well as any other description of the well.
   b. There should be a picture of every well in each of the data books and iPad database.

Reference Point

1. Verify the Reference Point (RP) by using the field iPad GIS program.
   a. Depth to groundwater must be measured relative to an established RP on the well casing. The RP can be identified with a permanent marker, paint spot, or a notch in the lip of the well casing. By convention in open casing monitoring wells, the RP is located on the north side of the well casing.
   b. In the well book and in the well database, there are pictures and descriptions of the RP to be used for each well. Always ask questions if you are uncertain about the location of the RP.
2. Make sure the measured RP is equal to the one listed on the first well card for each well. Note if there is a difference.
3. If no RP is apparent, measure the depth to groundwater from the north side of the top of the well casing, and note it in the comments.
4. If an access becomes blocked or a RP changes for any reason, this must be noted in the Comments, the new RP elevation must be surveyed, and the new value of RP feet above or below ground surface must be measured and recorded. New photographs to identify the new RP must also be taken and put into the iPad well database. All measurements are to be made in US Survey feet.

Measurement

1. After locating the RP, remove any cap, lid, or plug that covers the monitoring access point, listening for pressure release. If a release is observed, wait and allow the water level to equilibrate. Note in the Comments that a pressure release was observed and whether the pressure was causing air to flow out of or into the casing.
2. Never measure a well while it is pumping. Instead, record a P in the Pumping column and include any relevant notes in the Comments. If possible, visit the well later in the day or on a different day to obtain a static water level measurement.
3. If the well is rebounding or drawing down, record the appropriate code in the Pumping Key. Make a note of the distance that the water moved (up or down) and the time between measurements in the Comments. If possible, visit the well later in the day or on a different day to try and obtain a static water level measurement.
4. **Depth to groundwater must be measured to an accuracy of 0.01 feet.**
   a. This is true when using both the steel tape and the electronic sounding tape. The steel tape should be used in wells that have a history of oil on the surface of the water.
   b. Also use the steel tape if there are obstructions or tight spaces in the casing in which the electronic sounding tape could get stuck. Otherwise, use the electronic sounding tape.

   c. Repeat measurement after 15 minutes to verify that the static levels are not rebounding. Repeat until measurements are consistent. Typically, this should not be repeated over 3 times. But this process is left to the discretion of the technician. If consistency is not achieve, add note in the Comments.
5. See **Appendix A** for measurement and recording procedures using the steel tape.
6. See **Appendix B** for measurement and recording procedures using the sounder and electronic sounding tape.
7. Complete the well card and electronic water level measurement field form in accordance with the recording procedures.
   a. Assess the area around the well to determine any significant factors potentially affecting the well level and note any factors that may influence the depth to water readings, such as weather, nearby irrigation, flooding, tidal influence, and well condition.
   b. If there is a questionable measurement or the measurement could not be obtained, note it in the in the Pumping column and in the Comments.

Special Cases

1. If you find a well that has not been monitored during the past three monitoring periods and this information has been documented in the Comments (e.g. could not find, no access to old RP, well removed, etc.), make a special note and mark this well page in the book. Inform the Technical Unit Supervisor, so that the well can be removed from the well books.
2. If you are unable to measure a well, due to pumping or temporary blocked access for example, note the reason in the Comments.
3. In some wells, a layer of oil may float on the water surface.
   a. If the oil layer is a foot or less thick, use the steel tape. See **Appendix A** for the procedure for using the steel tape. Read the steel tape at the top of the oil mark and use this value for the water-level measurement instead of the wetted chalk mark. The measurement will differ slightly from the water level that would be measured were the oil not present. If there is oil in the well, it must be noted in the Comments and an E for estimated must be entered in the Pumping column of the electronic water level measurement field form.
   b. If several feet of oil are present in the well, or if it is necessary to know the thickness of the oil layer, a commercially available water-detector paste can be used that will detect the presence of water in the oil. The paste is applied to the lower end of the tape and will show the top of the oil as a wet line, and the top of the water will show as a distinct color change. Because oil density is about three-quarters that of water, the water level can be estimated by adding the thickness of the oil layer times its density to the oil- water interface elevation.

Decontamination

1. Do not decontaminate the tape between measurements at the same well. Only decontaminate the tape after completing the well measurement and before moving on to the next well.
2. To decontaminate the electronic sounding tape or steel tape, use a bleach water solution of 50 mg/liter (0.005 percent) to avoid any cross-contamination between wells.

3. If there is oil on the tape, use a non-toxic degreaser and remove all traces of oil before you use the bleach solution.

Appendix A: Procedure for Steel Tape

Materials and Instruments

1. A steel tape graduated in feet, tenths, and hundredths of feet
2. Blue carpenters' chalk
3. Well book
4. Pencil and eraser
5. iPad and electronic water level measurement field form
6. Wrenches with adjustable jaws and other tools to remove well cap

Data Accuracy and Limitations

1. A graduated steel tape is commonly accurate to 0.01 feet.
2. The water level should be within 500 feet of the land surface for steel tapes.
3. If the well casing is not plumb, the depth to water will have to be corrected.
4. When measuring deep water levels, tape expansion and stretch is an additional consideration.

Instructions

1. Chalk the lower 20 to 40 feet of the tape by pulling the tape across a piece of blue carpenter's chalk. The wetted chalk mark will identify that part of the tape that was submerged.
2. Lower the weight and tape into the well until the lower end of the tape is submerged below the water. The weight and tape should be lowered into the water slowly to prevent splashing. Continue to lower the end of the tape into the well until the next graduation (a whole-foot mark) is opposite the measuring RP, record this number in the RP column of the electronic water level measurement field form. The length of tape needed to reach the water surface can be estimated from previous water-level measurements. Otherwise, the length of tape needed to reach the water surface will have to be found by trial and error.
3. Rapidly bring the tape to the surface before the wetted chalk mark dries and becomes difficult to read.

Recording

1. Record the number of the wetted chalk mark in the WS column of the well book card.
2. Subtract the wetted chalk mark number (WS) from to the measuring RP. Record this number in the FT ABOVE column of the well book card.

3. Apply the RP correction to get the depth to water below (or above) the land-surface. If the RP is above land surface, the distance between the RP and land surface datum is subtracted from the depth to water from the RP to obtain the depth to water below land surface. If the RP is below land surface precede the RP correction value with a minus (-) sign and subtract the distance between the RP and land surface datum from the depth to water from the RP to obtain the depth to water below land surface. Record this number in the DIST TO WATER column of the well book card.
4. Record initials of the in the OBS. INT. column.
5. Once you have calculated and recorded the measurement in the well book, open the WELLS app on the iPad. Select the well you are measuring by clicking the blue "i" symbol. This should bring up all previous information on that specific well. If you wish to add a picture of the well to the information, select the camera icon next to "Add Data."
6. Click "Add Data" and select "Tape" for "Tool Used." Input your measurement into the "Tape Reading" section of the electronic water level measurement field form. Click "Update." You have successfully measured the well level.

Maintenance

1. Maintain the tape in good working condition by periodically physically checking the tape for rust, breaks, kinks, and possible stretch due to the suspended weight of the tape and the tape weight.
2. Our steel tapes are sent to USGS for calibration every two years.

Appendix B: Procedure for Electronic Sounding Tape

Materials and Instruments

1. Sounder and electric sounding tape
2. iPad and electronic water level measurement field form
3. Wrenches with adjustable jaws and other tools to remove well cap

Data Accuracy and Limitations

1. Oil, ice, or other debris may interfere with the water level measurement
2. Corrections to the measurements are necessary if the well casing is angled, and when measuring deep water levels because of tape expansion and stretch

Instructions

1. When using the sounder to measure depth to groundwater, it is generally good practice to use the least sensitive setting. Using a more sensitive setting will sometimes give false positives due to a wet or leaking casing. If you suspect that the casing has a hole, mention it in the Comments column on the electronic water level measurement field form. Do your best to ascertain the approximate depth of the hole relative to the reference point.
2. Approach the well with the sounder in hand. Then, place the sounder level on the ground or another surface near the opening of the well. Turn on the sounder device by turning the dial with "SENSITIVITY" written in bold letters above it to the least sensitive setting possible. Press the test button located on the same side as the knob. If you successfully turned on the sounder, a ringing noise will be clearly produced, and the red light above the test button will remain solid until you let go of the button. If there is no sound, start over.
3. Once the sounder is on, pull out the silver end of the tape and prepare to lower it into the well. Loosen the wheel knob on the other side of the sounder, opposite of both the test button and the "SENSITIVITY" knob. Once this knob is loosened, place the silver end of the tape into the entrance of the well. If the silver end does not begin to descend on its own, you may need to feed it into the entrance until there is enough weight for it to draw down by itself.
4. **Do not let go of the sounder.** If the well opening is big enough, the sounder may fall in. At that point, it will be lost. This equipment is expensive, and there are only so many in the County's possession. If the sounder becomes stuck, report its location to the Technical Unit Supervisor.

5. As you feed the silver end of the tape into the well or as it draws down under its own weight, belay the tape with your hand so that the tape is not damaged by the entrance of the well. Keep the descent as smooth as possible and avoid letting the silver end descend too quickly. If the well happens to be dry and the silver end hits the ground too hard, it may damage the equipment.
6. Once the same ringing noise from the test button sounds, pull the tape back until the noise is no longer heard. Then, slowly let the silver end descend again without belaying the line with your hand, as this may lead to an inaccurate measurement. Once you hear the ringing noise again, place your index finger at the point that the tape enters the well. Turn the tape over, and read the tape for the depth to groundwater measurement.
7. **You may now turn off the sounder; the ringing that it produces will be quite loud.**

Recording

1. When reading the tape, **ensure you record the full measurement.** Often, the depth to groundwater will not be an exact number (e.g. 100.00 ft). Numbers between 1 and 9 are tenths (0.10s) of a foot. Therefore, if your finger is on a number between 1 and 9, you must backtrack on the tape until you reach the next whole number. For example, if the number was six and the next whole number was 145, the full measurement would be 145.6 ft.
2. Once you have double-checked the measurement, open the WELLS app on the iPad. Select the well you are measuring by clicking the blue "i" symbol. This should bring up all previous information on that specific well. If you wish to add a picture of the well to the information, select the camera icon next to "Add Data."
3. Click "Add Data" and select the "Sounder" for "Tool Used."
4. The reference elevation should already be calculated. If the reference elevation is missing, determine your current altitude. (This can be done by searching "what is my altitude" on Google.)
5. For "Tape Reading (RP)," input your measurement in both the left and right field.
6. Continue to "Feet Above." "Feet Above" is the height of the well entrance from the ground. This simple measurement can be determined using a measuring tape or a ruler. If the measurement is already in the form, do not change it.
7. Once you have inputted all the information, click "Update." You have successfully measured the well level.

Calibration:

Our sounders are sent to USGS for calibration every two years.

Flowmeter Calibration Test Report

Well Owner:
Owner Address:
City, State, Zip:
Owner Telephone:
Contact Person:
State Well Number:
Well or Site Address:
Meter Manufacturer:

Well Operator:
Operator Address:
City, State, Zip:
Operator Telephone:
Contact Person:
Owner's Well Number:
Thomas Guide - Page & Section:
Is This Meter New from Manufacturer?
YES NO

Meter Serial Number:
Manufacturer Date:
Meter Size (inches):
Meter Units: AF CF Gal MI/h Other
Meter Multiplier
Meter Type:
Meter Use: Agricultural Domestic Municipal Industrial

Discharge Pipe Size (inches):
Tap Size & Type:
Meter Bypass Piping: YES NO Other
Is This A Bypass Meter?: YES NO
Underground Vault: YES NO Other
Pump Motor/Engine (horsepower):

Calibration or Repair Test Results

	Meter End	Meter Start	Volume Pumped	Run Time	Flow rate	Accuracy (%)
Test 1						
Test 2						
Test 3						

Remarks

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL COAST REGION

MONITORING AND REPORTING PROGRAM
ORDER NO. R3-2017-0002-01

TIER 1

DISCHARGERS ENROLLED UNDER
CONDITIONAL WAIVER OF WASTE DISCHARGE REQUIREMENTS FOR
DISCHARGES FROM IRRIGATED LANDS

This Monitoring and Reporting Program Order No. R3-2017-0002-01 (MRP) is issued pursuant to California Water Code (Water Code) sections 13267 and 13269, which authorize the California Regional Water Quality Control Board, Central Coast Region (hereafter Central Coast Water Board) to require preparation and submittal of technical and monitoring reports. Water Code section 13269 requires a waiver of waste discharge requirements to include as a condition the performance of monitoring and the public availability of monitoring results. *Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands*, Order No. R3-2017-0002 (Order) includes criteria and requirements for three tiers. This MRP sets forth monitoring and reporting requirements for **Tier 1 Dischargers** enrolled under the Order. A summary of the requirements is shown below.

SUMMARY OF MONITORING AND REPORTING REQUIREMENTS FOR TIER 1:

Part 1: Surface Receiving Water Monitoring and Reporting *(cooperative or individual)*
Part 2: Groundwater Monitoring and Reporting *(cooperative or individual)*

Pursuant to Water Code section 13269(a)(2), monitoring requirements must be designed to support the development and implementation of the waiver program, including, but not limited to, verifying the adequacy and effectiveness of the waiver's conditions. The monitoring and reports required by this MRP are to evaluate effects of discharges of waste from irrigated agricultural operations and individual farms/ranches on waters of the state and to determine compliance with the Order.

MONITORING AND REPORTING BASED ON TIERS

The Order and MRP include criteria and requirements for three tiers, based upon those characteristics of individual farms/ranches at the operation that present the highest level of waste discharge or greatest risk to water quality. Dischargers must meet conditions of the Order and MRP for the appropriate tier that applies to their land and/or the individual farm/ranch. Within a tier, Dischargers comply with requirements based on the specific level of discharge and threat to water quality from individual farms/ranches. The lowest tier, Tier 1, applies to dischargers who discharge the lowest level of waste (amount or concentration) or pose the lowest potential to cause or contribute to an exceedance of water quality standards in waters of the State or of the United States. The highest tier, Tier 3, applies to dischargers who discharge the highest level of waste or pose the greatest potential to cause or contribute to an exceedance of water quality standards in waters of the State or of the United States. Tier 2 applies to dischargers whose discharge has a moderate threat to water quality. Water quality is defined in terms of regional, state, or federal numeric or narrative water quality standards. Per the Order, Dischargers may submit a request to the Executive Officer to approve transfer to a lower tier. If the Executive Officer approves a transfer to a lower tier, any interested person may request that the Central Coast Water Board conduct a review of the Executive Officer's determination.

PART 1. SURFACE RECEIVING WATER MONITORING AND REPORTING REQUIREMENTS

The surface receiving water monitoring and reporting requirements described herein are generally a continuation of the surface receiving water monitoring and reporting requirements of Monitoring and Reporting Program Order No. 2012-0011-01, as revised August 22, 2016, with the intent of uninterrupted regular monitoring and reporting during the transition from Order No. R3-2012-0011-01 to Order No. R3-2017-0002-01.

Monitoring and reporting requirements for surface receiving water identified in Part 1.A. and Part 1.B. apply to Tier 1 Dischargers. Surface receiving water refers to water flowing in creeks and other surface waters of the State. Surface receiving water monitoring may be conducted through a cooperative monitoring program on behalf of Dischargers, or Dischargers may choose to conduct surface receiving water monitoring and reporting individually. Key monitoring and reporting requirements for surface receiving water are shown in Tables 1 and 2.

A. Surface Receiving Water Quality Monitoring

1. Dischargers must elect a surface receiving water monitoring option (cooperative monitoring program or individual receiving water monitoring) to comply with surface receiving water quality monitoring requirements, and identify the option selected on the Notice of Intent (NOI).

2. Dischargers are encouraged to choose participation in a cooperative monitoring program (e.g., the existing Cooperative Monitoring Program or a similar program) to comply with receiving water quality monitoring requirements. Dischargers not participating in a cooperative monitoring program must conduct surface receiving water quality monitoring individually that achieves the same purpose.

3. Dischargers (individually or as part of a cooperative monitoring program) must conduct surface receiving water quality monitoring to a) assess the impacts of their waste discharges from irrigated lands to receiving water, b) assess the status of receiving water quality and beneficial use protection in impaired waterbodies dominated by irrigated agricultural activity, c) evaluate status, short term patterns and long term trends (five to ten years or more) in receiving water quality, d) evaluate water quality impacts resulting from agricultural discharges (including but not limited to tile drain discharges), e) evaluate stormwater quality, f) evaluate condition of existing perennial, intermittent, or ephemeral streams or riparian or wetland area habitat, including degradation resulting from erosion or agricultural discharges of waste, and g) assist in the identification of specific sources of water quality problems.

Surface Receiving Water Quality Sampling and Analysis Plan

4. **By March 1, 2018, or as directed by the Executive Officer**, Dischargers (individually or as part of a cooperative monitoring program) must submit a surface receiving water quality Sampling and Analysis Plan (SAAP) and Quality Assurance Project Plan (QAPP); this requirement is satisfied if an approved SAAP and QAPP addressing all surface receiving water quality monitoring requirements described in this Order has been submitted pursuant to Order No. R3-2012-0011 and associated Monitoring and Reporting Programs. Dischargers (or a third party cooperative monitoring program) must develop the Sampling and Analysis Plan to describe how the proposed monitoring will achieve the objectives of the MRP and evaluate compliance with the Order. The Sampling and Analysis Plan may propose alternative monitoring site locations, adjusted monitoring parameters, and other changes as necessary to assess the impacts of waste discharges from irrigated lands to receiving water. The Executive Officer must approve the Sampling and Analysis Plan and QAPP.

5. The Sampling and Analysis Plan must include the following minimum required components:
    a. Monitoring strategy to achieve objectives of the Order and MRP;
    b. Map of monitoring sites with GIS coordinates;
    c. Identification of known water quality impairments and impaired waterbodies per the 2010 Clean Water Act 303(d) List of Impaired Waterbodies (List of Impaired Waterbodies);
    d. Identification of beneficial uses and applicable water quality standards;
    e. Identification of applicable Total Maximum Daily Loads;
    f. Monitoring parameters;
    g. Monitoring schedule, including description and frequencies of monitoring events;

h. Description of data analysis methods;

6. The QAPP must include receiving water and site-specific information, project organization and responsibilities, and quality assurance components of the MRP. The QAPP must also include the laboratory and field requirements to be used for analyses and data evaluation. The QAPP must contain adequate detail for project and Water Board staff to identify and assess the technical and quality objectives, measurement and data acquisition methods, and limitations of the data generated under the surface receiving water quality monitoring. All sampling and laboratory methodologies and QAPP content must be consistent with U.S. EPA methods, State Water Board's Surface Water Ambient Monitoring Program (SWAMP) protocols and the Central Coast Water Board's Central Coast Ambient Monitoring Program (CCAMP). Following U.S. EPA guidelines[1] and SWAMP templates[2], the receiving water quality monitoring QAPP must include the following minimum required components:
   a. Project Management. This component addresses basic project management, including the project history and objectives, roles and responsibilities of the participants, and other aspects.
   b. Data Generation and Acquisition. This component addresses all aspects of project design and implementation. Implementation of these elements ensures that appropriate methods for sampling, measurement and analysis, data collection or generation, data handling, and quality control activities are employed and are properly documented. Quality control requirements are applicable to all the constituents sampled as part of the MRP, as described in the appropriate method.
   c. Assessment and Oversight. This component addresses the activities for assessing the effectiveness of the implementation of the project and associated QA and QC activities. The purpose of the assessment is to provide project oversight that will ensure that the QA Project Plan is implemented as prescribed.
   d. Data Validation and Usability. This component addresses the quality assurance activities that occur after the data collection, laboratory analysis and data generation phase of the project is completed. Implementation of these elements ensures that the data conform to the specified criteria, thus achieving the MRP objectives.

[1] USEPA. 2001 (2006) USEPA Requirements for Quality Assurance Project Plans (QA/R-5) Office of Environmental Information, Washington, D.C. USEPA QA/R-5

[2] http://waterboards.ca.gov/water_issues/programs/swamp/tools.shtml#qa

7. The Central Coast Water Board may conduct an audit of contracted laboratories at any time in order to evaluate compliance with the QAPP.

8. The Sampling and Analysis Plan and QAPP, and any proposed revisions are subject to approval by the Executive Officer. The Executive Officer may also revise the Sampling and Analysis Plan, including adding, removing, or changing monitoring site locations, changing monitoring parameters, and other changes as necessary to assess the impacts of waste discharges from irrigated lands to receiving water.

Surface Receiving Water Quality Monitoring Sites

9. The Sampling and Analysis Plan must, at a minimum, include monitoring sites to evaluate waterbodies identified in Table 1, unless otherwise approved by the Executive Officer. The Sampling and Analysis Plan must include sites to evaluate receiving water quality impacts most directly resulting from areas of agricultural discharge (including areas receiving tile drain discharges). Site selection must take into consideration the existence of any long term monitoring sites included in related monitoring programs (e.g. CCAMP and the existing CMP). Sites may be added or modified, subject to prior approval by the Executive Officer, to better assess the pollutant loading from individual sources or the impacts to receiving waters caused by individual discharges. Any modifications must consider sampling consistency for purposes of trend evaluation.

Surface Receiving Water Quality Monitoring Parameters

10. The Sampling and Analysis Plan must, at a minimum, include the following types of monitoring and evaluation parameters listed below and identified in Table 2:

    a. Flow Monitoring;
    b. Water Quality (physical parameters, metals, nutrients, pesticides);
    c. Toxicity (water and sediment);
    d. Assessment of Benthic Invertebrates.

11. All analyses must be conducted at a laboratory certified for such analyses by the State Department of Public Health (CDPH) or at laboratories approved by the Executive Officer. Unless otherwise noted, all sampling, sample preservation, and analyses must be performed in accordance with the latest edition of *Test Methods for Evaluating Solid Waste*, SW-846, U.S. EPA, and analyzed as specified herein by the above analytical methods and reporting limits indicated. Certified laboratories can be found at the web link: http://www.cdph.ca.gov/certlic/labs/Documents/ELAPLablist.xls

12. Water quality and flow monitoring is used to assess the sources, concentrations, and loads of waste discharges from individual farms/ranches and groups of Dischargers to surface waters, to evaluate impacts to water quality and beneficial uses, and to evaluate the short term patterns and long term trends in receiving water quality. Monitoring data must be compared to existing numeric and narrative water quality objectives.

13. Toxicity testing is to evaluate water quality relative to the narrative toxicity objective. Water column toxicity analyses must be conducted on 100% (undiluted) sample. At sites where persistent unresolved toxicity is found, the Executive Officer may require concurrent toxicity and chemical analyses and a Toxicity Identification Evaluation (TIE) to identify the individual discharges causing the toxicity.

<u>Surface Receiving Water Quality Monitoring Frequency and Schedule</u>

14. The Sampling and Analysis Plan must include a schedule for sampling. Timing, duration, and frequency of monitoring must be based on the land use, complexity, hydrology, and size of the waterbody. Table 2 includes minimum monitoring frequency and parameter lists. Agricultural parameters that are less common may be monitored less frequently. Modifications to the receiving water quality monitoring parameters, frequency, and schedule may be submitted for Executive Officer consideration and approval. At a minimum, the Sampling and Analysis Plan schedule must consist of monthly monitoring of common agricultural parameters in major agricultural areas, including two major storm events during the wet season (October 1 – April 30).

15. Storm event monitoring must be conducted within 18 hours of storm events, preferably including the first flush run-off event that results in significant increase in stream flow. For purposes of this MRP, a storm event is defined as precipitation producing onsite runoff (surface water flow) capable of creating significant ponding, erosion or other water quality problem. A significant storm event will generally result in greater than 1-inch of rain within a 24-hour period.

16. Dischargers (individually or as part of a cooperative monitoring program) must perform receiving water quality monitoring per the Sampling and Analysis Plan and QAPP approved by the Executive Officer.

B. Surface Receiving Water Quality Reporting

<u>Surface Receiving Water Quality Data Submittal</u>

1. Dischargers (individually or as part of a cooperative monitoring program) must submit water quality monitoring data to the Central Coast Water Board electronically, in a format specified by the Executive Officer and compatible with SWAMP/CCAMP electronic submittal guidelines, each January 1, April 1, July 1, and October 1.

<u>Surface Receiving Water Quality Monitoring Annual Report</u>

2. **By July 1, 2017,** and every July 1 annually thereafter, Dischargers (individually or as part of a cooperative monitoring program) must submit an Annual Report, electronically, in a format specified by the Executive Officer including the following minimum elements:

a. Signed Transmittal Letter;
b. Title Page;
c. Table of Contents;
d. Executive Summary;
e. Summary of Exceedance Reports submitted during the reporting period;
f. Monitoring objectives and design;
g. Monitoring site descriptions and rainfall records for the time period covered;
h. Location of monitoring sites and map(s);
i. Tabulated results of all analyses arranged in tabular form so that the required information is readily discernible;
j. Summary of water quality data for any sites monitored as part of related monitoring programs, and used to evaluate receiving water as described in the Sampling and Analysis Plan.
k. Discussion of data to clearly illustrate compliance with the Order and water quality standards;
l. Discussion of short term patterns and long term trends in receiving water quality and beneficial use protection;
m. Evaluation of pesticide and toxicity analyses results, and recommendation of candidate sites for Toxicity Identification Evaluations (TIEs);
n. Identification of the location of any agricultural discharges observed discharging directly to surface receiving water;
o. Laboratory data submitted electronically in a SWAMP/CCAMP comparable format;
p. Sampling and analytical methods used;
q. Copy of chain-of-custody forms;
r. Field data sheets, signed laboratory reports, laboratory raw data;
s. Associated laboratory and field quality control samples results;
t. Summary of Quality Assurance Evaluation results;

u. Specify the method used to obtain flow at each monitoring site during each monitoring event;
v. Electronic or hard copies of photos obtained from all monitoring sites, clearly labeled with site ID and date;
w. Conclusions.

PART 2. GROUNDWATER MONITORING AND REPORTING REQUIREMENTS

Groundwater monitoring may be conducted through a cooperative monitoring and reporting program on behalf of growers, or Dischargers may choose to conduct groundwater monitoring and reporting individually. Qualifying cooperative groundwater monitoring and reporting programs must implement the groundwater monitoring and reporting requirements described in this Order, unless otherwise approved by the Executive Officer. An interested person may seek review by the Central Coast Water Board of the Executive Officer's approval or denial of a cooperative groundwater monitoring and reporting program.

Key monitoring and reporting requirements for groundwater are shown in Table 3.

A. Groundwater Monitoring

1. Dischargers must sample private domestic wells and the primary irrigation well on their farm/ranch to evaluate groundwater conditions in agricultural areas, identify areas at greatest risk for nitrogen loading and exceedance of drinking water standards, and identify priority areas for follow up actions.

2. Dischargers must sample at least one groundwater well for each farm/ranch on their operation, including groundwater wells that are located within the property boundary of the enrolled county assessor parcel numbers (APNs). For farms/ranches with multiple groundwater wells, Dischargers must sample all domestic wells and the primary irrigation well. For the purposes of this MRP, a "domestic well" is any well that is used or may be used for domestic use purposes, including any groundwater well that is connected to a residence, workshop, or place of business that may be used for human consumption, cooking, or sanitary purposes. Groundwater monitoring parameters must include well screen interval depths (if available), general chemical parameters, and general cations and anions listed in Table 3.

3. Dischargers must conduct two rounds of monitoring of required groundwater wells during calendar year 2017; one sample collected during spring (**March - June)** and one sample collected during fall **(September - December)**.

4. Groundwater samples must be collected by a qualified third party (e.g., consultant, technician, person conducting cooperative monitoring) using proper sampling methods, chain-of-custody, and quality assurance/quality

control protocols. Groundwater samples must be collected at or near the well head before the pressure tank and prior to any well head treatment. In cases where this is not possible, the water sample must be collected from a sampling point as close to the pressure tank as possible, or from a cold-water spigot located before any filters or water treatment systems.

5. Laboratory analyses for groundwater samples must be conducted by a State certified laboratory according to U.S. EPA approved methods; unless otherwise noted, all monitoring, sample preservation, and analyses must be performed in accordance with the latest edition of *Test Methods for Evaluating Solid Waste*, SW-846, United States Environmental Protection Agency, and analyzed as specified herein by the above analytical methods and reporting limits indicated. Certified laboratories can be found at the web link below: http://www.waterboards.ca.gov/centralcoast/water_issues/programs/ag_waivers/docs/resources4growers/2016_04_11_labs.pdf

6. If a discharger determines that water in any domestic well exceeds 10 mg/L of nitrate as N, the discharger or third party must provide notice to the Central Coast Water Board within 24 hours of learning of the exceedance. For domestic wells on a Discharger's farm/ranch that exceed 10 mg/L nitrate as N, the Discharger must provide written notification to the users within 10 days of learning of the exceedance and provide written confirmation of the notification to the Central Coast Water Board.

   The drinking water notification must include the statement that the water poses a human health risk due to elevated nitrate concentration, and include a warning against the use of the water for drinking or cooking. In addition, Dischargers must also provide prompt written notification to any new well users (e.g. tenants and employees with access to the affected well), whenever there is a change in occupancy.

   For all other domestic wells not on a Discharger's farm/ranch but that may be impacted by nitrate, the Central Coast Water Board will notify the users promptly.

   The drinking water notification and confirmation letters required by this Order are available to the public.

B. Groundwater Reporting

1. **Within 60 days of sample collection,** Dischargers must coordinate with the laboratory to submit the following groundwater monitoring results and information, electronically, using the Water Board's GeoTracker electronic deliverable format (EDF):
   a. GeoTracker Ranch Global Identification Number

b. Field point name (Well Name)
c. Field Point Class (Well Type)
d. Latitude
e. Longitude
f. Sample collection date
g. Analytical results
h. Well construction information (e.g., total depth, screened intervals, depth to water), as available

2. Dischargers must submit groundwater well information required in the electronic Notice of Intent (eNOI) for each farm/ranch and update the eNOI to reflect changes in the farm/ranch information within 30 days of the change. Groundwater well information reported on the eNOI includes, but is not limited to:

a. Number of groundwater wells present at each farm/ranch
b. Identification of any groundwater wells abandoned or destroyed (including method destroyed) in compliance with the Order
c. Use for fertigation or chemigation
d. Presence of back flow prevention devices
e. Number of groundwater wells used for agricultural purposes
f. Number of groundwater wells used for or may be used for domestic use purposes (domestic wells).

PART 3. GENERAL MONITORING AND REPORTING REQUIREMENTS

A. Submittal of Technical Reports

1. Dischargers must submit reports in a format specified by the Executive Officer. A transmittal letter must accompany each report, containing the following penalty of perjury statement signed by the Discharger or the Discharger's authorized agent:

   "In compliance with Water Code §13267, I certify under penalty of perjury that this document and all attachments were prepared by me, or under my direction or supervision following a system designed to assure that qualified personnel properly gather and evaluate the information submitted. To the best of my knowledge and belief, this document and all attachments are true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment".

2. If the Discharger asserts that all or a portion of a report submitted pursuant to this Order is subject to an exemption from public disclosure (e.g. trade secrets or secret processes), the Discharger must provide an explanation of how those portions of the reports are exempt from public disclosure. The

Discharger must clearly indicate on the cover of the report (typically an electronic submittal) that the Discharger asserts that all or a portion of the report is exempt from public disclosure, submit a complete report with those portions that are asserted to be exempt in redacted form, submit separately (in a separate electronic file) unredacted pages (to be maintained separately by staff). The Central Coast Water Board staff will determine whether any such report or portion of a report qualifies for an exemption from public disclosure. If the Central Coast Water Board staff disagrees with the asserted exemption from public disclosure, the Central Coast Water Board staff will notify the Discharger prior to making such report or portions of such report available for public inspection.

B. Central Coast Water Board Authority

1. Monitoring reports are required pursuant to section 13267 of the California Water Code. Pursuant to section 13268 of the Water Code, a violation of a request made pursuant to section 13267 may subject you to civil liability of up to $1000 per day.

2. The Water Board needs the required information to determine compliance with Order No.R3-2017-0002. The evidence supporting these requirements is included in the findings of Order No.R3-2017-0002.

John M. Robertson
Executive Officer

March 8, 2017
Date

Table 1. Major Waterbodies in Agricultural Areas[1]

Hydrologic SubArea	Waterbody Name	Hydrologic SubArea	Waterbody Name
30510	Pajaro River	30920	Quail Creek
30510	Salsipuedes Creek	30920	Salinas Reclamation Canal
30510	Watsonville Slough	31022	Chorro Creek
30510	Watsonville Creek[2]	31023	Los Osos Creek
30510	Beach Road Ditch[2]	31023	Warden Creek
30530	Carnadero Creek	31024	San Luis Obispo Creek
30530	Furlong Creek[2]	31024	Prefumo Creek
30530	Llagas Creek	31031	Arroyo Grande Creek
30530	Miller's Canal	31031	Los Berros Creek
30530	San Juan Creek	31210	Bradley Canyon Creek
30530	Tesquisquita Slough	31210	Bradley Channel
30600	Moro Cojo Slough	31210	Green Valley Creek
30910	Alisal Slough	31210	Main Street Canal
30910	Blanco Drain	31210	Orcutt Solomon Creek
30910	Old Salinas River	31210	Oso Flaco Creek
30910	Salinas River (below Gonzales Rd.)	31210	Little Oso Flaco Creek
30920	Salinas River (above Gonzales Rd. and below Nacimiento R.)	31210	Santa Maria River
30910	Santa Rita Creek[2]	31310	San Antonio Creek[2]
30910	Tembladero Slough	31410	Santa Ynez River
30920	Alisal Creek	31531	Bell Creek
30920	Chualar Creek	31531	Glenn Annie Creek
30920	Espinosa Slough	31531	Los Carneros Creek[2]
30920	Gabilan Creek	31534	Arroyo Paredon Creek
30920	Natividad Creek	31534	Franklin Creek

[1] At a minimum, monitoring sites must be included for these waterbodies in agricultural areas, unless otherwise approved by the Executive Officer. Monitoring sites may be proposed for addition or modification to better assess the impacts of waste discharges from irrigated lands to surface water. Dischargers choosing to comply with surface receiving water quality monitoring, individually (not part of a cooperative monitoring program) must only monitor sites for waterbodies receiving the discharge.

[2] These creeks are included because they are newly listed waterbodies on the 2010 303(d) list of Impaired Waters that are associated with areas of agricultural discharge.

Table 2. Surface Receiving Water Quality Monitoring Parameters

Parameters and Tests	RL[3]	Monitoring Frequency[1]
Photo Monitoring		
Upstream and downstream photographs at monitoring location		With every monitoring event
WATER COLUMN SAMPLING		
Physical Parameters and General Chemistry		
Flow (field measure) (CFS) following SWAMP field SOP[9]	.25	Monthly, including 2 stormwater events
pH (field measure)	0.1	”
Electrical Conductivity (field measure) (µS/cm)	2.5	”
Dissolved Oxygen (field measure) (mg/L)	0.1	”
Temperature (field measure) (°C)	0.1	”
Turbidity (NTU)	0.5	”
Total Dissolved Solids (mg/L)	10	”
Total Suspended Solids (mg/L)	0.5	”
Nutrients		
Total Nitrogen (mg/L)	0.5	Monthly, including 2 stormwater events
Nitrate + Nitrite (as N) (mg/L)	0.1	”
Total Ammonia (mg/L)	0.1	”
Unionized Ammonia (calculated value, mg/L))		”
Total Phosphorus (as P) (mg/L)	0.02	
Soluble Orthophosphate (mg/L)	0.01	”
Water column chlorophyll a (µg/L)	1.0	“
Algae cover, Floating Mats, % coverage	-	“
Algae cover, Attached, % coverage	-	“
Water Column Toxicity Test		
Algae - *Selenastrum capricornutum (*96-hour chronic; Method1003.0 in EPA/821/R-02/013)	-	4 times each year, twice in dry season, twice in wet season
Water Flea – *Ceriodaphnia dubia* (7-day chronic; Method 1002.0 in EPA/821/R-02/013)	-	”
Midge - *Chironomus spp.* (96-hour acute; Alternate test species in EPA 821-R-02-012)	-	“

Parameters and Tests	RL[3]	Monitoring Frequency[1]
Toxicity Identification Evaluation (TIE)	-	As directed by Executive Officer
Pesticides[2] /Herbicides (µg/L)		
Organophosphate Pesticides		
Azinphos-methyl	0.02	2 times in both 2017 and 2018, once in dry season and once in wet season of each year, concurrent with water toxicity monitoring
Chlorpyrifos	0.005	”
Diazinon	0.005	”
Dichlorvos	0.01	”
Dimethoate	0.01	”
Dimeton-s	0.005	”
Disulfoton (Disyton)	0.005	”
Malathion	0.005	”
Methamidophos	0.02	”
Methidathion	0.02	“
Parathion-methyl	0.02	“
Phorate	0.01	“
Phosmet	0.02	“
Neonicotinoids		
Thiamethoxam	.002	“
Imidacloprid	.002	“
Thiacloprid	.002	“
Dinotefuran	.006	“
Acetamiprid	.01	“
Clothianidin	.02	“
Herbicides		
Atrazine	0.05	“
Cyanazine	0.20	“
Diuron	0.05	“
Glyphosate	2.0	“
Linuron	0.1	“
Paraquat	0.20	“
Simazine	0.05	“
Trifluralin	0.05	“
Metals (µg/L)		
Arsenic (total) [5,7]	0.3	2 times in both 2017 and 2018, once in dry season and once in wet season of each year, concurrent with water toxicity monitoring
Boron (total) [6,7]	10	“
Cadmium (total & dissolved) [4.5,7]	0.01	“

Parameters and Tests	RL[3]	Monitoring Frequency[1]
Copper (total and dissolved) [4,7]	0.01	"
Lead (total and dissolved) [4,7]	0.01	"
Nickel (total and dissolved) [4,7]	0.02	"
Molybdenum (total) [7]	1	"
Selenium (total)[7]	0.30	"
Zinc (total and dissolved) [4.5,7]	0.10	"
Other (µg/L)		
Total Phenolic Compounds[8]	5	2 times in 2017, once in spring (April-May) and once in fall (August-September)
Hardness (mg/L as CaCO3)	1	"
Total Organic Carbon (ug/L)	0.6	"
<u>SEDIMENT SAMPLING</u>		
Sediment Toxicity - *Hyalella azteca* 10-day static renewal (EPA, 2000)		2 times each year, once in spring (April-May) and once in fall (August-September)
Pyrethroid Pesticides in Sediment (µg/kg)		
Gamma-cyhalothrin	2	2 times in both 2017 and 2018, once in spring (April-May) and once in fall (August-September) of each year, concurrent with sediment toxicity sampling
Lambda-cyhalothrin	2	"
Bifenthrin	2	"
Beta-cyfluthrin	2	"
Cyfluthrin	2	"
Esfenvalerate	2	"
Permethrin	2	"
Cypermethrin	2	"
Danitol	2	"
Fenvalerate	2	"
Fluvalinate	2	"
Other Monitoring in Sediment		
Chlorpyrifos (µg/kg)	2	"
Total Organic Carbon	0.01%	"
		"
Sediment Grain Size Analysis	1%	"

[1]Monitoring frequency may be used as a guide for developing alternative Sampling and Analysis Plans implemented by individual growers.
[2]Pesticide list may be modified based on specific pesticide use in Central Coast Region. Analytes on this list must be reported, at a minimum.
[3] Reporting Limit, taken from SWAMP where applicable.
[4] Holmgren, Meyer, Cheney and Daniels. 1993. Cadmium, Lead, Zinc, Copper and Nickel in Agricultural Soils of the United States. J. of Environ. Quality 22:335-348.

[5]Sax and Lewis, ed. 1987. Hawley's Condensed Chemical Dictionary. 11th ed. New York: Van Nostrand Reinhold Co., 1987. Zinc arsenate is an insecticide.
[6]Http://www.coastalagro.com/products/labels/9%25BORON.pdf; Boron is applied directly or as a component of fertilizers as a plant nutrient.
[7]Madramootoo, Johnston, Willardson, eds. 1997. Management of Agricultural Drainage Water Quality. International Commission on Irrigation and Drainage. U.N. FAO. SBN 92-6-104058.3.
[8]http://cat.inist.fr/?aModele=afficheN&cpsidt=14074525; Phenols are breakdown products of herbicides and pesticides. Phenols can be directly toxic and cause endocrine disruption.
[9]See SWAMP field measures SOP, p. 17
mg/L – milligrams per liter; ug/L – micrograms per liter; ug/kg – micrograms per kilogram;
NTU – Nephelometric Turbidity Units; CFS – cubic feet per second.

Table 3. Groundwater Sampling Parameters

Parameter	RL	Analytical Method[3]	Units
pH	0.1	Field or Laboratory Measurement EPA General Methods	pH Units
Specific Conductance	2.5		µS/cm
Total Dissolved Solids	10		mg/L
Total Alkalinity as $CaCO_3$		EPA Method 310.1 or 310.2	
Calcium	0.05	General Cations[1] EPA 200.7, 200.8, 200.9	
Magnesium	0.02		
Sodium	0.1		
Potassium	0.1		
Sulfate (SO4)	1.0	General Anions EPA Method 300 or EPA Method 353.2	
Chloride	0.1		
Nitrate + Nitrite (as N)[2] or Nitrate as N	0.1		

[1]General chemistry parameters (major cations and anions) represent geochemistry of water bearing zone and assist in evaluating quality assurance/quality control of groundwater monitoring and laboratory analysis.
[2]The MRP allows analysis of "nitrate plus nitrite" to represent nitrate concentrations (as N). The "nitrate plus nitrite" analysis allows for extended laboratory holding times and relieves the Discharger of meeting the short holding time required for nitrate.
[3]Dischargers may use alternative analytical methods approved by EPA.
RL – Reporting Limit; µS/cm – micro siemens per centimeter

Table 4. Tier 1 - Time Schedule for Key Monitoring and Reporting Requirements (MRPs)

REQUIREMENT	TIME SCHEDULE[1]
Submit Sampling And Analysis Plan and Quality Assurance Project Plan (SAAP/QAPP) for Surface Receiving Water Quality Monitoring *(individually or through cooperative monitoring program)*	By March 1, 2018, or as directed by the Executive Officer; satisfied if an approved SAAP/QAPP has been submitted pursuant to Order No. R3-2012-0011 and associated MRPs
Initiate surface receiving water quality monitoring *(individually or through cooperative monitoring program)*	Per an approved SAAP and QAPP
Submit surface receiving water quality monitoring data *(individually or through cooperative monitoring program)*	Each January 1, April 1, July 1, and October 1

Submit surface receiving water quality Annual Monitoring Report *(individually or through cooperative monitoring program)*	By July 1 2017; annually thereafter by July 1
Initiate monitoring of groundwater wells	First sample from March-June 2017, second sample from September-December 2017
Submit groundwater monitoring results	Within 60 days of the sample collection

[1] Dates are relative to adoption of this Order, unless otherwise specified.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL COAST REGION

MONITORING AND REPORTING PROGRAM
ORDER NO. R3-2017-0002-02

TIER 2

DISCHARGERS ENROLLED UNDER
THE CONDITIONAL WAIVER OF WASTE DISCHARGE REQUIREMENTS FOR
DISCHARGES FROM IRRIGATED LANDS

This Monitoring and Reporting Program Order No. R3-2017-0002-02 (MRP) is issued pursuant to California Water Code (Water Code) sections 13267 and 13269, which authorize the California Regional Water Quality Control Board, Central Coast Region (hereafter Central Coast Water Board) to require preparation and submittal of technical and monitoring reports. Water Code section 13269 requires a waiver of waste discharge requirements to include as a condition the performance of monitoring and the public availability of monitoring results. *Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands*, Order No. R3-2017-0002 (Order) includes criteria and requirements for three tiers. This MRP sets forth monitoring and reporting requirements for **Tier 2 Dischargers** enrolled under the Order. A summary of the requirements is shown below.

SUMMARY OF MONITORING AND REPORTING REQUIREMENTS FOR TIER 2:

Part 1: Surface Receiving Water Monitoring and Reporting *(cooperative or individual)*
Part 2: Groundwater Monitoring and Reporting *(cooperative or individual)*
Total Nitrogen Applied Reporting *(required for subset of Tier 2 Dischargers if farm/ranch growing any crop with high nitrate loading risk to groundwater);*
Part 3: Annual Compliance Form

Pursuant to Water Code section 13269(a)(2), monitoring requirements must be designed to support the development and implementation of the waiver program, including, but not limited to, verifying the adequacy and effectiveness of the waiver's conditions. The monitoring and reports required by this MRP are to evaluate effects of discharges of waste from irrigated agricultural operations and individual farms/ranches on waters of the state and to determine compliance with the Order.

MONITORING AND REPORTING BASED ON TIERS

The Order and MRP include criteria and requirements for three tiers, based upon those characteristics of the individual farms/ranches at the operation that present the highest level of waste discharge or greatest risk to water quality. Dischargers must meet conditions of the Order and MRP for the appropriate tier that applies to their land and/or the individual farm/ranch. Within a tier, Dischargers comply with requirements based on the specific level of discharge and threat to water quality from individual farms/ranches. The lowest tier, Tier 1, applies to dischargers who discharge the lowest level of waste (amount or concentration) or pose the lowest potential to cause or contribute to an exceedance of water quality standards in waters of the State or of the United States. The highest tier, Tier 3, applies to dischargers who discharge the highest level of waste or pose the greatest potential to cause or contribute to an exceedance of water quality standards in waters of the State or of the United States. Tier 2 applies to dischargers whose discharge has a moderate threat to water quality. Water quality is defined in terms of regional, state, or federal numeric or narrative water quality standards. Per the Order, Dischargers may submit a request to the Executive Officer to approve transfer to a lower tier. If the Executive Officer approves a transfer to a lower tier, any interested person may request that the Central Coast Water Board conduct a review of the Executive Officer's determination.

PART 1. SURFACE RECEIVING WATER MONITORING AND REPORTING REQUIREMENTS

The surface receiving water monitoring and reporting requirements described herein are generally a continuation of the surface receiving water monitoring and reporting requirements of Monitoring and Reporting Program Order No. 2012-0011-02, as revised August 22, 2016, with the intent of uninterrupted regular monitoring and reporting during the transition from Order No. R3-2012-0011-02 to Order No. R3-2017-0002-02.

Monitoring and reporting requirements for surface receiving water identified in Part 1.A. and Part 1.B. apply to Tier 2 Dischargers. Surface receiving water refers to water flowing in creeks and other surface waters of the State. Surface receiving water monitoring may be conducted through a cooperative monitoring program on behalf of Dischargers, or Dischargers may choose to conduct surface receiving water monitoring and reporting individually. Key monitoring and reporting requirements for surface receiving water are shown in Tables 1 and 2. Time schedules are shown in Table4.

A. Surface Receiving Water Quality Monitoring

1. Dischargers must elect a surface receiving water monitoring option (cooperative monitoring program or individual receiving water monitoring) to comply with surface receiving water quality monitoring requirements, and identify the option selected on the Notice of Intent (NOI).

2. Dischargers are encouraged to choose participation in a cooperative monitoring program (e.g., the existing Cooperative Monitoring Program or a similar program) to comply with receiving water quality monitoring requirements. Dischargers not participating in a cooperative monitoring program must conduct surface receiving water quality monitoring individually that achieves the same purpose.

3. Dischargers (individually or as part of a cooperative monitoring program) must conduct surface receiving water quality monitoring to a) assess the impacts of their waste discharges from irrigated lands to receiving water, b) assess the status of receiving water quality and beneficial use protection in impaired waterbodies dominated by irrigated agricultural activity, c) evaluate status, short term patterns and long term trends (five to ten years or more) in receiving water quality, d) evaluate water quality impacts resulting from agricultural discharges (including but not limited to tile drain discharges), e) evaluate stormwater quality, f) evaluate condition of existing perennial, intermittent, or ephemeral streams or riparian or wetland area habitat, including degradation resulting from erosion or agricultural discharges of waste, and g) assist in the identification of specific sources of water quality problems.

<u>Surface Receiving Water Quality Sampling and Analysis Plan</u>

4. **By March 1, 2018, or as directed by the Executive Officer**, Dischargers (individually or as part of a cooperative monitoring program) must submit a surface receiving water quality Sampling and Analysis Plan (SAAP) and Quality Assurance Project Plan (QAPP); this requirement is satisfied if an approved SAAP and QAPP addressing all surface receiving water quality monitoring requirements described in this Order has been submitted pursuant to Order No.R3-2012-0011 and associated Monitoring and Reporting Programs. Dischargers (or a third party cooperative monitoring program) must develop the Sampling and Analysis Plan to describe how the proposed monitoring will achieve the objectives of the MRP and evaluate compliance with the Order. The Sampling and Analysis Plan may propose alternative monitoring site locations, adjusted monitoring parameters, and other changes as necessary to assess the impacts of waste discharges from irrigated lands to receiving water. The Executive Officer must approve the Sampling and Analysis Plan and QAPP.

5. The Sampling and Analysis Plan must include the following minimum required components:
    a. Monitoring strategy to achieve objectives of the Order and MRP;
    b. Map of monitoring sites with GIS coordinates;

c. Identification of known water quality impairments and impaired waterbodies per the 2010 Clean Water Act 303(d) List of Impaired Waterbodies (List of Impaired Waterbodies);
d. Identification of beneficial uses and applicable water quality standards;
e. Identification of applicable Total Maximum Daily Loads;
f. Monitoring parameters;
g. Monitoring schedule, including description and frequencies of monitoring events;
h. Description of data analysis methods;

6. The QAPP must include receiving water and site-specific information, project organization and responsibilities, and quality assurance components of the MRP. The QAPP must also include the laboratory and field requirements to be used for analyses and data evaluation. The QAPP must contain adequate detail for project and Water Board staff to identify and assess the technical and quality objectives, measurement and data acquisition methods, and limitations of the data generated under the surface receiving water quality monitoring. All sampling and laboratory methodologies and QAPP content must be consistent with U.S. EPA methods, State Water Board's Surface Water Ambient Monitoring Program (SWAMP) protocols and the Central Coast Water Board's Central Coast Ambient Monitoring Program (CCAMP). Following U.S. EPA guidelines[1] and SWAMP templates[2], the receiving water quality monitoring QAPP must include the following minimum required components:
   a. Project Management. This component addresses basic project management, including the project history and objectives, roles and responsibilities of the participants, and other aspects.
   b. Data Generation and Acquisition. This component addresses all aspects of project design and implementation. Implementation of these elements ensures that appropriate methods for sampling, measurement and analysis, data collection or generation, data handling, and quality control activities are employed and are properly documented. Quality control requirements are applicable to all the constituents sampled as part of the MRP, as described in the appropriate method.
   c. Assessment and Oversight. This component addresses the activities for assessing the effectiveness of the implementation of the project and associated QA and QC activities. The purpose of the assessment is to provide project oversight that

[1] USEPA 2001 (2006) USEPA requirements for Quality Assurance Project Plans (QA/R-5) Office of Environmental Information, Washington, D.C. USEPA QA/R-5
[2] http://waterboards.ca.gov/water_issues/programs/swamp/tools.shtml#qa

will ensure that the QA Project Plan is implemented as prescribed.

d. Data Validation and Usability. This component addresses the quality assurance activities that occur after the data collection, laboratory analysis and data generation phase of the project is completed. Implementation of these elements ensures that the data conform to the specified criteria, thus achieving the MRP objectives.

7. The Central Coast Water Board may conduct an audit of contracted laboratories at any time in order to evaluate compliance with the QAPP.

8. The Sampling and Analysis Plan and QAPP, and any proposed revisions are subject to approval by the Executive Officer. The Executive Officer may also revise the Sampling and Analysis Plan, including adding, removing, or changing monitoring site locations, changing monitoring parameters, and other changes as necessary to assess the impacts of waste discharges from irrigated lands to receiving water.

Surface Receiving Water Quality Monitoring Sites

9. The Sampling and Analysis Plan must, at a minimum, include monitoring sites to evaluate waterbodies identified in Table 1, unless otherwise approved by the Executive Officer. The Sampling and Analysis Plan must include sites to evaluate receiving water quality impacts most directly resulting from areas of agricultural discharge (including areas receiving tile drain discharges). Site selection must take into consideration the existence of any long term monitoring sites included in related monitoring programs (e.g. CCAMP and the existing CMP). Sites may be added or modified, subject to prior approval by the Executive Officer, to better assess the pollutant loading from individual sources or the impacts to receiving waters caused by individual discharges. Any modifications must consider sampling consistency for purposes of trend evaluation.

Surface Receiving Water Quality Monitoring Parameters

10. The Sampling and Analysis Plan must, at a minimum, include the following types of monitoring and evaluation parameters listed below and identified in Table 2:

    a. Flow Monitoring;
    b. Water Quality (physical parameters, metals, nutrients, pesticides);
    c. Toxicity (water and sediment);
    d. Assessment of Benthic Invertebrates.

11. All analyses must be conducted at a laboratory certified for such analyses by the State Department of Public Health (CDPH) or at laboratories approved by the Executive Officer. Unless otherwise noted, all sampling, sample preservation, and analyses must be performed in accordance with the latest edition of *Test Methods for Evaluating Solid Waste*, SW-846, U.S. EPA, and analyzed as specified herein by the above analytical methods and reporting limits indicated. Certified laboratories can be found at the web link: http://www.cdph.ca.gov/certlic/labs/Documents/ELAPLablist.xls

12. Water quality and flow monitoring is used to assess the sources, concentrations, and loads of waste discharges from individual farms/ranches and groups of Dischargers to surface waters, to evaluate impacts to water quality and beneficial uses, and to evaluate the short term patterns and long term trends in receiving water quality. Monitoring data must be compared to existing numeric and narrative water quality objectives.

13. Toxicity testing is to evaluate water quality relative to the narrative toxicity objective. Water column toxicity analyses must be conducted on 100% (undiluted) sample. At sites where persistent unresolved toxicity is found, the Executive Officer may require concurrent toxicity and chemical analyses and a Toxicity Identification Evaluation (TIE) to identify the individual discharges causing the toxicity.

Surface Receiving Water Quality Monitoring Frequency and Schedule

14. The Sampling and Analysis Plan must include a schedule for sampling. Timing, duration, and frequency of monitoring must be based on the land use, complexity, hydrology, and size of the waterbody. Table 2 includes minimum monitoring frequency and parameter lists. Agricultural parameters that are less common may be monitored less frequently. Modifications to the receiving water quality monitoring parameters, frequency, and schedule may be submitted for Executive Officer consideration and approval. At a minimum, the Sampling and Analysis Plan schedule must consist of monthly monitoring of common agricultural parameters in major agricultural areas, including two major storm events during the wet season (October 1 – April 30).

15. Storm event monitoring must be conducted within 18 hours of storm events, preferably including the first flush run-off event that results in significant increase in stream flow. For purposes of this MRP, a storm event is defined as precipitation producing onsite runoff (surface water flow) capable of creating significant ponding, erosion or other water quality problem. A

significant storm event will generally result in greater than 1-inch of rain within a 24-hour period.

16. Dischargers (individually or as part of a cooperative monitoring program) must perform receiving water quality monitoring per the Sampling and Analysis Plan and QAPP approved by the Executive Officer.

B. Surface Receiving Water Quality Reporting

Surface Receiving Water Quality Data Submittal

1. Dischargers (individually or as part of a cooperative monitoring program) must submit water quality monitoring data to the Central Coast Water Board electronically, in a format specified by the Executive Officer and compatible with SWAMP/CCAMP electronic submittal guidelines, each January 1, April 1, July 1, and October 1.

Surface Receiving Water Quality Monitoring Annual Report

2. **By July 1, 2017,** and every July 1 annually thereafter, Dischargers (individually or as part of a cooperative monitoring program) must submit an Annual Report, electronically, in a format specified by the Executive Officer including the following minimum elements:
   a. Signed Transmittal Letter;
   b. Title Page;
   c. Table of Contents;
   d. Executive Summary;
   e. Summary of Exceedance Reports submitted during the reporting period;
   f. Monitoring objectives and design;
   g. Monitoring site descriptions and rainfall records for the time period covered;
   h. Location of monitoring sites and map(s);
   i. Tabulated results of all analyses arranged in tabular form so that the required information is readily discernible;
   j. Summary of water quality data for any sites monitored as part of related monitoring programs, and used to evaluate receiving water as described in the Sampling and Analysis Plan.
   k. Discussion of data to clearly illustrate compliance with the Order and water quality standards;
   l. Discussion of short term patterns and long term trends in receiving water quality and beneficial use protection;
   m. Evaluation of pesticide and toxicity analyses results, and recommendation of candidate sites for Toxicity Identification Evaluations (TIEs);

n. Identification of the location of any agricultural discharges observed discharging directly to surface receiving water;
o. Laboratory data submitted electronically in a SWAMP/CCAMP comparable format;
p. Sampling and analytical methods used;
q. Copy of chain-of-custody forms;
r. Field data sheets, signed laboratory reports, laboratory raw data;
s. Associated laboratory and field quality control samples results;
t. Summary of Quality Assurance Evaluation results;
u. Specify the method used to obtain flow at each monitoring site during each monitoring event;
v. Electronic or hard copies of photos obtained from all monitoring sites, clearly labeled with site ID and date;
w. Conclusions.

PART 2. GROUNDWATER MONITORING AND REPORTING REQUIREMENTS

Groundwater monitoring may be conducted through a cooperative monitoring and reporting program on behalf of growers, or Dischargers may choose to conduct groundwater monitoring and reporting individually. Qualifying cooperative groundwater monitoring and reporting programs must implement the groundwater monitoring and reporting requirements described in this Order, unless otherwise approved by the Executive Officer. An interested person may seek review by the Central Coast Water Board of the Executive Officer's approval or denial of a cooperative groundwater monitoring and reporting program.

Key monitoring and reporting requirements for groundwater are shown in Table 3.

A. Groundwater Monitoring

1. Dischargers must sample private domestic wells and the primary irrigation well on their farm/ranch to evaluate groundwater conditions in agricultural areas, identify areas at greatest risk for nitrogen loading and exceedance of drinking water standards, and identify priority areas for follow up actions.

2. Dischargers must sample at least one groundwater well for each farm/ranch on their operation, including groundwater wells that are located within the property boundary of the enrolled county assessor parcel numbers (APNs). For farms/ranches with multiple groundwater wells, Dischargers must sample all domestic wells and the primary irrigation well. For the purposes of this MRP, a "domestic well" is any well that is used or may be used for domestic use purposes, including any groundwater well that is connected to a residence, workshop, or place of business that may be used for human consumption, cooking, or sanitary purposes. Groundwater monitoring

parameters must include well screen interval depths (if available), general chemical parameters, and general cations and anions listed in Table 3.

3. Dischargers must conduct two rounds of monitoring of required groundwater wells during calendar year 2017; one sample collected during spring (**March - June)** and one sample collected during fall **(September - December)**.

4. Groundwater samples must be collected by a qualified third party (e.g., consultant, technician, person conducting cooperative monitoring) using proper sampling methods, chain-of-custody, and quality assurance/quality control protocols. Groundwater samples must be collected at or near the well head before the pressure tank and prior to any well head treatment. In cases where this is not possible, the water sample must be collected from a sampling point as close to the pressure tank as possible, or from a cold-water spigot located before any filters or water treatment systems.

5. Laboratory analyses for groundwater samples must be conducted by a State certified laboratory according to U.S. EPA approved methods; unless otherwise noted, all monitoring, sample preservation, and analyses must be performed in accordance with the latest edition of *Test Methods for Evaluating Solid Waste*, SW-846, United States Environmental Protection Agency, and analyzed as specified herein by the above analytical methods and reporting limits indicated. Certified laboratories can be found at the web link below: http://www.waterboards.ca.gov/centralcoast/water_issues/programs/ag_waivers/docs/resources4growers/2016_04_11_labs.pdf

6. If a discharger determines that water in any domestic well exceeds 10 mg/L of nitrate as N, the discharger or third party must provide notice to the Central Coast Water Board within 24 hours of learning of the exceedance. For domestic wells on a Discharger's farm/ranch, that exceed 10 mg/L of nitrate as N, the Discharger must provide written notification to the users within 10 days of learning of the exceedance and provide written confirmation of the notification to the Central Coast Water Board.

   The drinking water notification must include the statement that the water poses a human health risk due to elevated nitrate concentration, and include a warning against the use of the water for drinking or cooking. In addition, Dischargers must also provide prompt written notification to any new well users (e.g. tenants and employees with access to the affected well), whenever there is a change in occupancy.

   For all other domestic wells not on a Discharger's farm/ranch but that may be impacted by nitrate, the Central Coast Water Board will notify the users promptly.

The drinking water notification and confirmation letters required by this Order are available to the public.

B. Groundwater Reporting

1. **Within 60 days of sample collection,** Dischargers must coordinate with the laboratory to submit the following groundwater monitoring results and information, electronically, using the Water Board's GeoTracker electronic deliverable format (EDF):
   a. GeoTracker Ranch Global Identification Number
   b. Field point name (Well Name)
   c. Field Point Class (Well Type)
   d. Latitude
   e. Longitude
   f. Sample collection date
   g. Analytical results
   h. Well construction information (e.g., total depth, screened intervals, depth to water), as available

2. Dischargers must submit groundwater well information required in the electronic Notice of Intent (eNOI) for each farm/ranch and update the eNOI to reflect changes in the farm/ranch information within 30 days of the change. Groundwater well information reported on the eNOI includes, but is not limited to:
   a. Number of groundwater wells present at each farm/ranch
   b. Identification of any groundwater wells abandoned or destroyed (including method destroyed) in compliance with the Order
   c. Use for fertigation or chemigation
   d. Presence of back flow prevention devices
   e. Number of groundwater wells used for agricultural purposes
   f. Number of groundwater wells used for or may be used for domestic use purposes (domestic wells).

C. Total Nitrogen Applied Reporting

1. By March 1, 2018, and by March 1 annually thereafter, Tier 2 Dischargers growing any crop with a high potential to discharge nitrogen to groundwater must record and report total nitrogen applied for each specific crop that was irrigated and grown for commercial purposes on that farm/ranch during the preceding calendar year (January through December).

   Crops with a high potential to discharge nitrogen to groundwater are: beet, broccoli, cabbage, cauliflower, celery, Chinese cabbage (napa), collard, endive, kale, leek, lettuce (leaf and head), mustard, onion (dry and green), spinach, strawberry, pepper (fruiting), and parsley.

Total nitrogen applied must be reported on the Total Nitrogen Applied Report form as described in the Total Nitrogen Applied Report form instructions.

Total nitrogen applied includes any product containing any form or concentration of nitrogen including, but not limited to, organic and inorganic fertilizers, slow release products, compost, compost teas, manure, and extracts.

2. The Total Nitrogen Applied Report form includes the following information:
   a. General ranch information such as GeoTracker file numbers, name, location, acres.
   b. Nitrogen concentration of irrigation water
   c. Nitrogen applied in pounds per acre with irrigation water
   d. Nitrogen present in the soil
   e. Nitrogen applied with compost and amendments
   f. Specific crops grown
   g. Nitrogen applied in pounds per acre with fertilizers and other materials to each specific crop grown
   h. Crop acres of each specific crop grown
   i. Whether each specific crop was grown organically or conventionally
   j. Basis for the nitrogen applied
   k. Explanation and comments section
   l. Certification statement with penalty of perjury declaration
   m. Additional information regarding whether each specific crop was grown in a nursery, greenhouse, hydroponically, in containers, and similar variables.

PART 3. ANNUAL COMPLIANCE FORM

Tier 2 Dischargers must submit annual compliance information, electronically, on the Annual Compliance Form. The purpose of the electronic Annual Compliance Form is to provide information to the Central Coast Water Board to assist in the evaluation of threat to water quality from individual agricultural discharges of waste and measure progress towards water quality improvement and verify compliance with the Order and MRP. Time schedules are shown in Table 4.

A. Annual Compliance Form

1. **By March 1, 2018, and updated annually thereafter by March 1**, Tier 2 Dischargers must submit an Annual Compliance Form electronically, in a

format specified by the Executive Officer. The electronic Annual Compliance Form includes, but is not limited to the following minimum requirements[1]:

a. Question regarding consistency between the Annual Compliance Form and the electronic Notice of Intent (eNOI);
b. Information regarding type and characteristics of discharge (e.g., number of discharge points, estimated flow/volume, number of tailwater days);
c. Identification of any direct agricultural discharges to a stream, lake, estuary, bay, or ocean;
d. Identification of specific farm water quality management practices completed, in progress, and planned to address water quality impacts caused by discharges of waste including irrigation management, pesticide management, nutrient management, salinity management, stormwater management, and sediment and erosion control to achieve compliance with this Order; and identification of specific methods used, and described in the Farm Plan consistent with Order Provision 44.g., for the purposes of assessing the effectiveness of management practices implemented and the outcomes of such assessments;
e. Proprietary information question and justification;
f. Authorization and certification statement and declaration of penalty of perjury.

PART 5. GENERAL MONITORING AND REPORTING REQUIREMENTS

A. Submittal of Technical Reports

1. Dischargers must submit reports in a format specified by the Executive Officer. A transmittal letter must accompany each report, containing the following penalty of perjury statement signed by the Discharger or the Discharger's authorized agent:

   "In compliance with Water Code §13267, I certify under penalty of perjury that this document and all attachments were prepared by me, or under my direction or supervision following a system designed to assure that qualified personnel properly gather and evaluate the information submitted. To the best of my knowledge and belief, this document and all attachments are true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment".

[1] Items reported in the Annual Compliance Form are due by March 1, 2018, and annually thereafter, unless otherwise specified.

2. If the Discharger asserts that all or a portion of a report submitted pursuant to this Order is subject to an exemption from public disclosure (e.g. trade secrets or secret processes), the Discharger must provide an explanation of how those portions of the reports are exempt from public disclosure. The Discharger must clearly indicate on the cover of the report (typically an electronic submittal) that the Discharger asserts that all or a portion of the report is exempt from public disclosure, submit a complete report with those portions that are asserted to be exempt in redacted form, submit separately (in a separate electronic file) unredacted pages (to be maintained separately by staff). The Central Coast Water Board staff will determine whether any such report or portion of a report qualifies for an exemption from public disclosure. If the Central Coast Water Board staff disagrees with the asserted exemption from public disclosure, the Central Coast Water Board staff will notify the Discharger prior to making such report or portions of such report available for public inspection.

B. Central Coast Water Board Authority

1. Monitoring reports are required pursuant to section 13267 of the California Water Code. Pursuant to section 13268 of the Water Code, a violation of a request made pursuant to section 13267 may subject you to civil liability of up to $1000 per day.

2. The Water Board needs the required information to determine compliance with Order No. R3-2017-0002. The evidence supporting these requirements is included in the findings of Order No. R3-2017-0002.

John M. Robertson
Executive Officer

March 8, 2017
Date

Table 1. Major Waterbodies in Agricultural Areas[1]

Hydrologic SubArea	Waterbody Name	Hydrologic SubArea	Waterbody Name
30510	Pajaro River	30920	Quail Creek
30510	Salsipuedes Creek	30920	Salinas Reclamation Canal
30510	Watsonville Slough	31022	Chorro Creek
30510	Watsonville Creek[2]	31023	Los Osos Creek
30510	Beach Road Ditch[2]	31023	Warden Creek
30530	Carnadero Creek	31024	San Luis Obispo Creek
30530	Furlong Creek[2]	31024	Prefumo Creek
30530	Llagas Creek	31031	Arroyo Grande Creek
30530	Miller's Canal	31031	Los Berros Creek
30530	San Juan Creek	31210	Bradley Canyon Creek
30530	Tesquisquita Slough	31210	Bradley Channel
30600	Moro Cojo Slough	31210	Green Valley Creek
30910	Alisal Slough	31210	Main Street Canal
30910	Blanco Drain	31210	Orcutt Solomon Creek
30910	Old Salinas River	31210	Oso Flaco Creek
30910	Salinas River (below Gonzales Rd.)	31210	Little Oso Flaco Creek
30920	Salinas River above Gonzales Rd. and below Nacimiento R.)	31210	Santa Maria River
30910	Santa Rita Creek[2]	31310	San Antonio Creek[2]
30910	Tembladero Slough	31410	Santa Ynez River
30920	Alisal Creek	31531	Bell Creek
30920	Chualar Creek	31531	Glenn Annie Creek
30920	Espinosa Slough	31531	Los Carneros Creek[2]
30920	Gabilan Creek	31534	Arroyo Paredon Creek
30920	Natividad Creek	31534	Franklin Creek

[1] At a minimum, monitoring sites must be included for these waterbodies in agricultural areas, unless otherwise approved by the Executive Officer. Monitoring sites may be proposed for addition or modification to better assess the impacts of waste discharges from irrigated lands to surface water. Dischargers choosing to comply with surface receiving water quality monitoring, individually (not part of a cooperative monitoring program) must only monitor sites for waterbodies receiving the discharge.
[2] These creeks are included because they are newly listed waterbodies on the 2010 303(d) list of Impaired Waters that are associated with areas of agricultural discharge.

Table 2. Surface Receiving Water Quality Monitoring Parameters

Parameters and Tests	RL[3]	Monitoring Frequency[1]
Photo Monitoring		
Upstream and downstream photographs at monitoring location		With every monitoring event
WATER COLUMN SAMPLING **Physical Parameters and General Chemistry**		
Flow (field measure) (CFS) following SWAMP field SOP[9]	.25	Monthly, including 2 stormwater events
pH (field measure)	0.1	”
Electrical Conductivity (field measure) (µS/cm)	2.5	”
Dissolved Oxygen (field measure) (mg/L)	0.1	”
Temperature (field measure) (^oC)	0.1	”
Turbidity (NTU)	0.5	”
Total Dissolved Solids (mg/L)	10	”
Total Suspended Solids (mg/L)	0.5	”
Nutrients		
Total Nitrogen (mg/L)	0.5	Monthly, including 2 stormwater events
Nitrate + Nitrite (as N) (mg/L)	0.1	”
Total Ammonia (mg/L)	0.1	”
Unionized Ammonia (calculated value, mg/L))		”
Total Phosphorus (as P) (mg/L)	0.02	
Soluble Orthophosphate (mg/L)	0.01	”
Water column chlorophyll a (µg/L)	1.0	“
Algae cover, Floating Mats, % coverage	-	“
Algae cover, Attached, % coverage	-	“
Water Column Toxicity Test		
Algae - *Selenastrum capricornutum (*96-hour chronic; Method1003.0 in EPA/821/R-02/013)	-	4 times each year, twice in dry season, twice in wet season
Water Flea – *Ceriodaphnia dubia* (7-day chronic; Method 1002.0 in EPA/821/R-02/013)	-	”
Midge - *Chironomus spp.* (96-hour acute; Alternate test species in EPA 821-R-02-012)	-	“

Parameters and Tests	RL[3]	Monitoring Frequency[1]
Toxicity Identification Evaluation (TIE)	-	As directed by Executive Officer
Pesticides[2] /Herbicides (µg/L)		
Organophosphate Pesticides		
Azinphos-methyl	0.02	2 times in both 2017 and 2018, once in dry season and once in wet season of each year, concurrent with water toxicity monitoring
Chlorpyrifos	0.005	”
Diazinon	0.005	”
Dichlorvos	0.01	”
Dimethoate	0.01	”
Dimeton-s	0.005	”
Disulfoton (Disyton)	0.005	”
Malathion	0.005	”
Methamidophos	0.02	”
Methidathion	0.02	“
Parathion-methyl	0.02	“
Phorate	0.01	“
Phosmet	0.02	“
Neonicotinoids		
Thiamethoxam	.002	“
Imidacloprid	.002	“
Thiacloprid	.002	“
Dinotefuran	.006	“
Acetamiprid	.01	“
Clothianidin	.02	
Herbicides		
Atrazine	0.05	“
Cyanazine	0.20	“
Diuron	0.05	“
Glyphosate	2.0	“
Linuron	0.1	“
Paraquat	0.20	“
Simazine	0.05	“
Trifluralin	0.05	“
Metals (µg/L)		
Arsenic (total) [5,7]	0.3	2 times in both 2017 and 2018, once in dry season and once in wet season of each year, concurrent with water toxicity monitoring
Boron (total) [6,7]	10	“

Parameters and Tests	RL[3]	Monitoring Frequency[1]
Cadmium (total & dissolved) [4,5,7]	0.01	“
Copper (total and dissolved) [4,7]	0.01	“
Lead (total and dissolved) [4,7]	0.01	“
Nickel (total and dissolved) [4,7]	0.02	“
Molybdenum (total) [7]	1	“
Selenium (total)[7]	0.30	“
Zinc (total and dissolved) [4,5,7]	0.10	“
Other (µg/L)		
Total Phenolic Compounds[8]	5	2 times in 2017, once in spring (April-May) and once in fall (August-September)
Hardness (mg/L as CaCO3)	1	“
Total Organic Carbon (ug/L)	0.6	“
SEDIMENT SAMPLING		
Sediment Toxicity - *Hyalella azteca* 10-day static renewal (EPA, 2000)		2 times each year, once in spring (April-May) and once in fall (August-September)
Pyrethroid Pesticides in Sediment (µg/kg)		
Gamma-cyhalothrin	2	2 times in both 2017 and 2018, once in spring (April-May) and once in fall (August-September) of each year, concurrent with sediment toxicity sampling
Lambda-cyhalothrin	2	“
Bifenthrin	2	“
Beta-cyfluthrin	2	“
Cyfluthrin	2	“
Esfenvalerate	2	“
Permethrin	2	“
Cypermethrin	2	“
Danitol	2	“
Fenvalerate	2	“
Fluvalinate	2	“
Other Monitoring in Sediment		
Chlorpyrifos (µg/kg)	2	“
Total Organic Carbon	0.01%	“
		“
Sediment Grain Size Analysis	1%	“

[1]Monitoring is ongoing through all five years of the Order, unless otherwise specified. Monitoring frequency may be used as a guide for developing alternative Sampling and Analysis Plan.
[2]Pesticide list may be modified based on specific pesticide use in Central Coast Region. Analytes on this list must be reported, at a minimum.

[3] Reporting Limit, taken from SWAMP where applicable.
[4] Holmgren, Meyer, Cheney and Daniels. 1993. Cadmium, Lead, Zinc, Copper and Nickel in Agricultural Soils of the United States. J. of Environ. Quality 22:335-348.
[5] Sax and Lewis, ed. 1987. Hawley's Condensed Chemical Dictionary. 11th ed. New York: Van Nostrand Reinhold Co., 1987. Zinc arsenate is an insecticide.
[6] Http://www.coastalagro.com/products/labels/9%25BORON.pdf; Boron is applied directly or as a component of fertilizers as a plant nutrient.
[7] Madramootoo, Johnston, Willardson, eds. 1997. Management of Agricultural Drainage Water Quality. International Commission on Irrigation and Drainage. U.N. FAO. SBN 92-6-104058.3.
[8] http://cat.inist.fr/?aModele=afficheN&cpsidt=14074525; Phenols are breakdown products of herbicides and pesticides. Phenols can be directly toxic and cause endocrine disruption.
[9] See SWAMP field measures SOP, p. 17
mg/L – milligrams per liter; ug/L – micrograms per liter; ug/kg – micrograms per kilogram;
NTU – Nephelometric Turbidity Units; CFS – cubic feet per second;

Table 3. Groundwater Monitoring Parameters

Parameter	RL	Analytical Method[3]	Units
pH	0.1	Field or Laboratory Measurement EPA General Methods	pH Units
Specific Conductance	2.5		µS/cm
Total Dissolved Solids	10		mg/L
Total Alkalinity as CaCO3	1	EPA Method 310.1 or 310.2	
Calcium	0.05	General Cations[1] EPA 200.7, 200.8, 200.9	
Magnesium	0.02		
Sodium	0.1		
Potassium	0.1		
Sulfate (SO4)	1.0	General Anions EPA Method 300 or EPA Method 353.2	
Chloride	0.1		
Nitrate + Nitrite (as N)[2] or Nitrate as N	0.1		

[1] General chemistry parameters (major cations and anions) represent geochemistry of water bearing zone and assist in evaluating quality assurance/quality control of groundwater sampling and laboratory analysis.
[2] The MRP allows analysis of "nitrate plus nitrite" to represent nitrate concentrations (as N). The "nitrate plus nitrite" analysis allows for extended laboratory holding times and relieves the Discharger of meeting the short holding time required for nitrate.
[3] Dischargers may use alternative analytical methods approved by EPA.
RL – Reporting Limit; µS/cm – micro siemens per centimeter

Table4. Tier 2 - Time Schedule for Key Monitoring and Reporting Requirements (MRPs)

REQUIREMENT	TIME SCHEDULE[1]
Submit Sampling And Analysis Plan and Quality Assurance Project Plan (SAAP/QAPP) for Surface Receiving Water Quality Monitoring (*individually or through cooperative monitoring program*)	By March 1, 2018, or as directed by the Executive Officer; satisfied if an approved SAAP/QAPP has been submitted pursuant to Order No. R3-2012-0011 and associated MRPs
Initiate surface receiving water quality monitoring (*individually or through cooperative monitoring program*)	Per an approved SAAP and QAPP
Submit surface receiving water quality monitoring data (*individually or through cooperative monitoring program*)	Each January 1, April 1, July 1, and October 1
Submit surface receiving water quality Annual Monitoring Report *(individually or through cooperative monitoring program*)	By July 12017; annually thereafter by July 1
Initiate monitoring of groundwater wells	First sample from March-June 2017, second sample from September-December 2017
Submit electronic Annual Compliance Form	March 1, 2018 and every March 1 annually thereafter
Submit groundwater monitoring results	Within 60 days of the sample collection
Tier 2 Dischargers with farms/ranches growing high risk crops: Report total nitrogen applied on the Total Nitrogen Applied form	March 1, 2018 and every March 1annually thereafter

[1] Dates are relative to adoption of this Order or enrollment date for Dischargers enrolled after the adoption of this Order, unless otherwise specified.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL COAST REGION

MONITORING AND REPORTING PROGRAM
ORDER NO. R3-2017-0002-03

TIER 3

DISCHARGERS ENROLLED UNDER
CONDITIONAL WAIVER OF WASTE DISCHARGE REQUIREMENTS FOR
DISCHARGES FROM IRRIGATED LANDS

This Monitoring and Reporting Program Order No. R3-2017-0002-03 (MRP) is issued pursuant to California Water Code (Water Code) sections 13267 and 13269, which authorize the California Regional Water Quality Control Board, Central Coast Region (hereafter Central Coast Water Board) to require preparation and submittal of technical and monitoring reports. Water Code section 13269 requires a waiver of waste discharge requirements to include as a condition, the performance of monitoring and the public availability of monitoring results. *Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands,* Order No. R3-2017-0002 (Order), includes criteria and requirements for three tiers. This MRP sets forth monitoring and reporting requirements for **Tier 3 Dischargers** enrolled under the Order. A summary of the requirements is shown below.

SUMMARY OF MONITORING AND REPORTING REQUIREMENTS FOR TIER 3:

- Part 1: Surface Receiving Water Monitoring and Reporting *(cooperative or individual)*
- Part 2: Groundwater Monitoring and Reporting *(cooperative or individual)*
  Total Nitrogen Applied Reporting *(required for subset of Tier 3 Dischargers if farm/ranch growing any crop with high nitrate loading risk to groundwater);*
- Part 3: Annual Compliance Form
- Part 5: Individual Surface Water Discharge Monitoring and Reporting
- Part 6: Irrigation and Nutrient Management Plan *(required for subset of Tier 3 Dischargers if farm/ranch has High Nitrate Loading Risk)*
- Part 7: Water Quality Buffer Plan *(required for subset of Tier 3 Dischargers if farm/ranch contains or is adjacent to a waterbody impaired for temperature, turbidity or sediment)*

Pursuant to Water Code section 13269(a)(2), monitoring requirements must be designed to support the development and implementation of the waiver program, including, but not limited to, verifying the adequacy and effectiveness of the waiver's conditions. The monitoring and reports required by this MRP are to evaluate effects of discharges of waste from irrigated agricultural operations and individual farms/ranches on waters of the state and to determine compliance with the Order.

MONITORING AND REPORTING BASED ON TIERS

The Order and MRP includes criteria and requirements for three tiers, based upon those characteristics of the individual farms/ranches at the operation that present the highest level of waste discharge or greatest risk to water quality. Dischargers must meet conditions of the Order and MRP for the appropriate tier that applies to their land and/or the individual farm/ranch. Within a tier, Dischargers comply with requirements based on the specific level of discharge and threat to water quality from individual farms/ranches. The lowest tier, Tier 1, applies to dischargers who discharge the lowest level of waste (amount or concentration) or pose the lowest potential to cause or contribute to an exceedance of water quality standards in waters of the State or of the United States. The highest tier, Tier 3, applies to dischargers who discharge the highest level of waste or pose the greatest potential to cause or contribute to an exceedance of water quality standards in waters of the State or of the United States. Tier 2 applies to dischargers whose discharge has a moderate threat to water quality. Water quality is defined in terms of regional, state, or federal numeric or narrative water quality standards. Per the Order, Dischargers may submit a request to the Executive Officer to approve transfer to a lower tier. If the Executive Officer approves a transfer to a lower tier, any interested person may request that the Central Coast Water Board conduct a review of the Executive Officer's determination.

PART 1. SURFACE RECEIVING WATER MONITORING AND REPORTING REQUIREMENTS

The surface receiving water monitoring and reporting requirements described herein are generally a continuation of the surface receiving water monitoring and reporting requirements of Monitoring and Reporting Program Order No. 2012-0011-03, as revised August 22, 2016, with the intent of uninterrupted regular monitoring and reporting during the transition from Order No. R3-2012-0011-03 to Order No. R3-2017-0002-03.

Monitoring and reporting requirements for surface receiving water identified in Part 1.A. and Part 1.B. apply to Tier 3 Dischargers. Surface receiving water refers to water flowing in creeks and other surface waters of the State. Surface receiving water monitoring may be conducted through a cooperative monitoring program on behalf of Dischargers, or Dischargers may choose to conduct surface receiving water monitoring and reporting individually. Key monitoring and reporting requirements for surface receiving water are shown in Tables 1 and 2. Time schedules are shown in Table 5.

A. Surface Receiving Water Quality Monitoring

1. Dischargers must elect a surface receiving water monitoring option (cooperative monitoring program or individual receiving water monitoring) to comply with surface receiving water quality monitoring requirements, and identify the option selected on the Notice of Intent (NOI).

2. Dischargers are encouraged to choose participation in a cooperative monitoring program (e.g., the existing Cooperative Monitoring Program or a similar program) to comply with receiving water quality monitoring requirements. Dischargers not participating in a cooperative monitoring program must conduct surface receiving water quality monitoring individually that achieves the same purpose.

3. Dischargers (individually or as part of a cooperative monitoring program) must conduct surface receiving water quality monitoring to a) assess the impacts of their waste discharges from irrigated lands to receiving water, b) assess the status of receiving water quality and beneficial use protection in impaired waterbodies dominated by irrigated agricultural activity, c) evaluate status, short term patterns and long term trends (five to ten years or more) in receiving water quality, d) evaluate water quality impacts resulting from agricultural discharges (including but not limited to tile drain discharges), e) evaluate stormwater quality, f) evaluate condition of existing perennial, intermittent, or ephemeral streams or riparian or wetland area habitat, including degradation resulting from erosion or agricultural discharges of waste, and g) assist in the identification of specific sources of water quality problems.

<u>Surface Receiving Water Quality Sampling and Analysis Plan</u>

4. **By March 1, 2018, or as directed by the Executive Officer**, Dischargers (individually or as part of a cooperative monitoring program) must submit a surface receiving water quality Sampling and Analysis Plan (SAAP) and Quality Assurance Project Plan (QAPP); this requirement is satisfied if an approved SAAP and QAPP addressing all surface receiving water quality monitoring requirements described in this Order has been submitted pursuant to Order No.R3-2012-0011 and associated Monitoring and Reporting Programs. Dischargers (or a third party cooperative monitoring program) must develop the Sampling and Analysis Plan to describe how the proposed monitoring will achieve the objectives of the MRP and evaluate compliance with the Order. The Sampling and Analysis Plan may propose alternative monitoring site locations, adjusted monitoring parameters, and other changes as necessary to assess the impacts of waste discharges from irrigated lands to receiving water. The Executive Officer must approve the Sampling and Analysis Plan and QAPP.

5. The Sampling and Analysis Plan must include the following minimum required components:
    a. Monitoring strategy to achieve objectives of the Order and MRP;
    b. Map of monitoring sites with GIS coordinates;

c. Identification of known water quality impairments and impaired waterbodies per the 2010 Clean Water Act 303(d) List of Impaired Waterbodies (List of Impaired Waterbodies);
d. Identification of beneficial uses and applicable water quality standards;
e. Identification of applicable Total Maximum Daily Loads;
f. Monitoring parameters;
g. Monitoring schedule, including description and frequencies of monitoring events;
h. Description of data analysis methods;

6. The QAPP must include receiving water and site-specific information, project organization and responsibilities, and quality assurance components of the MRP. The QAPP must also include the laboratory and field requirements to be used for analyses and data evaluation. The QAPP must contain adequate detail for project and Water Board staff to identify and assess the technical and quality objectives, measurement and data acquisition methods, and limitations of the data generated under the surface receiving water quality monitoring. All sampling and laboratory methodologies and QAPP content must be consistent with U.S. EPA methods, State Water Board's Surface Water Ambient Monitoring Program (SWAMP) protocols and the Central Coast Water Board's Central Coast Ambient Monitoring Program (CCAMP). Following U.S. EPA guidelines[1] and SWAMP templates[2], the receiving water quality monitoring QAPP must include the following minimum required components:
   a. Project Management. This component addresses basic project management, including the project history and objectives, roles and responsibilities of the participants, and other aspects.
   b. Data Generation and Acquisition. This component addresses all aspects of project design and implementation. Implementation of these elements ensures that appropriate methods for sampling, measurement and analysis, data collection or generation, data handling, and quality control activities are employed and are properly documented. Quality control requirements are applicable to all the constituents sampled as part of the MRP, as described in the appropriate method.
   c. Assessment and Oversight. This component addresses the activities for assessing the effectiveness of the implementation of the project and associated QA and QC activities. The purpose of the assessment is to provide project oversight that

[1] USEPA. 2001 (2006) USEPA Requirements for Quality Assurance Project Plans (QA/R-5) Office of Environmental Information, Washington, D.C. USEPA QA/R-5
[2] http://waterboards.ca.gov/water_issues/programs/swamp/tools.shtml#qa

will ensure that the QA Project Plan is implemented as prescribed.

d. Data Validation and Usability. This component addresses the quality assurance activities that occur after the data collection, laboratory analysis and data generation phase of the project is completed. Implementation of these elements ensures that the data conform to the specified criteria, thus achieving the MRP objectives.

7. The Central Coast Water Board may conduct an audit of contracted laboratories at any time in order to evaluate compliance with the QAPP.

8. The Sampling and Analysis Plan and QAPP, and any proposed revisions are subject to approval by the Executive Officer. The Executive Officer may also revise the Sampling and Analysis Plan, including adding, removing, or changing monitoring site locations, changing monitoring parameters, and other changes as necessary to assess the impacts of waste discharges from irrigated lands to receiving water.

<u>Surface Receiving Water Quality Monitoring Sites</u>

9. The Sampling and Analysis Plan must, at a minimum, include monitoring sites to evaluate waterbodies identified in Table 1, unless otherwise approved by the Executive Officer. The Sampling and Analysis Plan must include sites to evaluate receiving water quality impacts most directly resulting from areas of agricultural discharge (including areas receiving tile drain discharges). Site selection must take into consideration the existence of any long term monitoring sites included in related monitoring programs (e.g. CCAMP and the existing CMP). Sites may be added or modified, subject to prior approval by the Executive Officer, to better assess the pollutant loading from individual sources or the impacts to receiving waters caused by individual discharges. Any modifications must consider sampling consistency for purposes of trend evaluation.

<u>Surface Receiving Water Quality Monitoring Parameters</u>

10. The Sampling and Analysis Plan must, at a minimum, include the following types of monitoring and evaluation parameters listed below and identified in Table 2:

    a. Flow Monitoring;
    b. Water Quality (physical parameters, metals, nutrients, pesticides);
    c. Toxicity (water and sediment);
    d. Assessment of Benthic Invertebrates.

11. All analyses must be conducted at a laboratory certified for such analyses by the State Department of Public Health (CDPH) or at laboratories approved by the Executive Officer. Unless otherwise noted, all sampling, sample preservation, and analyses must be performed in accordance with the latest edition of *Test Methods for Evaluating Solid Waste*, SW-846, U.S. EPA, and analyzed as specified herein by the above analytical methods and reporting limits indicated. Certified laboratories can be found at the web link: http://www.cdph.ca.gov/certlic/labs/Documents/ELAPLablist.xls

12. Water quality and flow monitoring is used to assess the sources, concentrations, and loads of waste discharges from individual farms/ranches and groups of Dischargers to surface waters, to evaluate impacts to water quality and beneficial uses, and to evaluate the short term patterns and long term trends in receiving water quality. Monitoring data must be compared to existing numeric and narrative water quality objectives.

13. Toxicity testing is to evaluate water quality relative to the narrative toxicity objective. Water column toxicity analyses must be conducted on 100% (undiluted) sample. At sites where persistent unresolved toxicity is found, the Executive Officer may require concurrent toxicity and chemical analyses and a Toxicity Identification Evaluation (TIE) to identify the individual discharges causing the toxicity.

Surface Receiving Water Quality Monitoring Frequency and Schedule

14. The Sampling and Analysis Plan must include a schedule for sampling. Timing, duration, and frequency of monitoring must be based on the land use, complexity, hydrology, and size of the waterbody. Table 2 includes minimum monitoring frequency and parameter lists. Agricultural parameters that are less common may be monitored less frequently. Modifications to the receiving water quality monitoring parameters, frequency, and schedule may be submitted for Executive Officer consideration and approval. At a minimum, the Sampling and Analysis Plan schedule must consist of monthly monitoring of common agricultural parameters in major agricultural areas, including two major storm events during the wet season (October 1 – April 30).

15. Storm event monitoring must be conducted within 18 hours of storm events, preferably including the first flush run-off event that results in significant increase in stream flow. For purposes of this MRP, a storm event is defined as precipitation producing onsite runoff (surface water flow) capable of creating significant ponding, erosion or other water quality problem. A

significant storm event will generally result in greater than 1-inch of rain within a 24-hour period.

16. Dischargers (individually or as part of a cooperative monitoring program) must perform receiving water quality monitoring per the Sampling and Analysis Plan and QAPP approved by the Executive Officer.

B. Surface Receiving Water Quality Reporting

<u>Surface Receiving Water Quality Data Submittal</u>

1. Dischargers (individually or as part of a cooperative monitoring program) must submit water quality monitoring data to the Central Coast Water Board electronically, in a format specified by the Executive Officer and compatible with SWAMP/CCAMP electronic submittal guidelines, each January 1, April 1, July 1, and October 1.

<u>Surface Receiving Water Quality Monitoring Annual Report</u>

2. **By July 1, 2017,** and every July 1 annually thereafter, Dischargers (individually or as part of a cooperative monitoring program) must submit an Annual Report, electronically, in a format specified by the Executive Officer including the following minimum elements:
   a. Signed Transmittal Letter;
   b. Title Page;
   c. Table of Contents;
   d. Executive Summary;
   e. Summary of Exceedance Reports submitted during the reporting period;
   f. Monitoring objectives and design;
   g. Monitoring site descriptions and rainfall records for the time period covered;
   h. Location of monitoring sites and map(s);
   i. Tabulated results of all analyses arranged in tabular form so that the required information is readily discernible;
   j. Summary of water quality data for any sites monitored as part of related monitoring programs, and used to evaluate receiving water as described in the Sampling and Analysis Plan.
   k. Discussion of data to clearly illustrate compliance with the Order and water quality standards;
   l. Discussion of short term patterns and long term trends in receiving water quality and beneficial use protection;

m. Evaluation of pesticide and toxicity analyses results, and recommendation of candidate sites for Toxicity Identification Evaluations (TIEs);
n. Identification of the location of any agricultural discharges observed discharging directly to surface receiving water;
o. Laboratory data submitted electronically in a SWAMP/CCAMP comparable format;
p. Sampling and analytical methods used;
q. Copy of chain-of-custody forms;
r. Field data sheets, signed laboratory reports, laboratory raw data;
s. Associated laboratory and field quality control samples results;
t. Summary of Quality Assurance Evaluation results;
u. Specify the method used to obtain flow at each monitoring site during each monitoring event;
v. Electronic or hard copies of photos obtained from all monitoring sites, clearly labeled with site ID and date;
w. Conclusions.

PART 2. GROUNDWATER MONITORING AND REPORTING REQUIREMENTS

Groundwater monitoring may be conducted through a cooperative monitoring and reporting program on behalf of growers, or Dischargers may choose to conduct groundwater monitoring and reporting individually. Qualifying cooperative groundwater monitoring and reporting programs must implement the groundwater monitoring and reporting requirements described in this Order, unless otherwise approved by the Executive Officer. An interested person may seek review by the Central Coast Water Board of the Executive Officer's approval or denial of a cooperative groundwater monitoring and reporting program.

Key monitoring and reporting requirements for groundwater are shown in Table 3.

A. Groundwater Monitoring

1. Dischargers must sample private domestic wells and the primary irrigation well on their farm/ranch to evaluate groundwater conditions in agricultural areas, identify areas at greatest risk for nitrogen loading and exceedance of drinking water standards, and identify priority areas for follow up actions.

2. Dischargers must sample at least one groundwater well for each farm/ranch on their operation, including groundwater wells that are located within the property boundary of the enrolled county assessor parcel numbers (APNs). For farms/ranches with multiple groundwater wells, Dischargers must sample all domestic wells and the primary irrigation well. For the purposes of this MRP, a "domestic well" is any well that is used or may be used for domestic

use purposes, including any groundwater well that is connected to a residence, workshop, or place of business that may be used for human consumption, cooking, or sanitary purposes. Groundwater monitoring parameters must include well screen interval depths (if available), general chemical parameters, and general cations and anions listed in Table 3.

3. Dischargers must conduct two rounds of monitoring of required groundwater wells during calendar year 2017; one sample collected during spring (**March - June)** and one sample collected during fall **(September - December)**.

4. Groundwater samples must be collected by a qualified third party (e.g., consultant, technician, person conducting cooperative monitoring) using proper sampling methods, chain-of-custody, and quality assurance/quality control protocols. Groundwater samples must be collected at or near the well head before the pressure tank and prior to any well head treatment. In cases where this is not possible, the water sample must be collected from a sampling point as close to the pressure tank as possible, or from a cold-water spigot located before any filters or water treatment systems.

5. Laboratory analyses for groundwater samples must be conducted by a State certified laboratory according to U.S. EPA approved methods; unless otherwise noted, all monitoring, sample preservation, and analyses must be performed in accordance with the latest edition of *Test Methods for Evaluating Solid Waste*, SW-846, United States Environmental Protection Agency, and analyzed as specified herein by the above analytical methods and reporting limits indicated. Certified laboratories can be found at the web link below: http://www.waterboards.ca.gov/centralcoast/water_issues/programs/ag_waivers/docs/resources4growers/2016_04_11_labs.pdf

6. If a discharger determines that water in any domestic well exceeds 10 mg/L of nitrate as N, the discharger or third party must provide notice to the Central Coast Water Board within 24 hours of learning of the exceedance. For domestic wells on a Discharger's farm/ranch that exceed 10 mg/L nitrate as N, the Discharger must provide written notification to the users within 10 days of learning of the exceedance and provide written confirmation of the notification to the Central Coast Water Board.

   The drinking water notification must include the statement that the water poses a human health risk due to elevated nitrate concentration, and include a warning against the use of the water for drinking or cooking. In addition, Dischargers must also provide prompt written notification to any new well users (e.g. tenants and employees with access to the affected well), whenever there is a change in occupancy.

For all other domestic wells not on a Discharger's property, the Central Coast Water Board will notify the users promptly.

The drinking water notification and confirmation letters required by this Order are available to the public.

B. Groundwater Reporting

1. **Within 60 days of sample collection,** Dischargers must coordinate with the laboratory to submit the following groundwater monitoring results and information, electronically, using the Water Board's GeoTracker electronic deliverable format (EDF):
    a. GeoTracker Ranch Global Identification Number
    b. Field point name (Well Name)
    c. Field Point Class (Well Type)
    d. Latitude
    e. Longitude
    f. Sample collection date
    g. Analytical results
    h. Well construction information (e.g., total depth, screened intervals, depth to water), as available

2. Dischargers must submit groundwater well information required in the electronic Notice of Intent (eNOI) for each farm/ranch and update the eNOI to reflect changes in the farm/ranch information within 30 days of the change. Groundwater well information reported on the eNOI includes, but is not limited to:
    a. Number of groundwater wells present at each farm/ranch
    b. Identification of any groundwater wells abandoned or destroyed (including method destroyed) in compliance with the Order
    c. Use for fertigation or chemigation
    d. Presence of back flow prevention devices
    e. Number of groundwater wells used for agricultural purposes
    f. Number of groundwater wells used for or may be used for domestic use purposes (domestic wells)

C. Total Nitrogen Applied Reporting

1. By March 1, 2018, and by March 1 annually thereafter, Tier 3 Dischargers growing any crop with a high potential to discharge nitrogen to groundwater must record and report total nitrogen applied for each specific crop that was irrigated and grown for commercial purposes on that farm/ranch during the preceding calendar year (January through December).

    Crops with a high potential to discharge nitrogen to groundwater are: beet, broccoli, cabbage, cauliflower, celery, Chinese cabbage (napa), collard, endive, kale, leek, lettuce (leaf and head), mustard, onion (dry and green), spinach, strawberry, pepper (fruiting), and parsley.

Total nitrogen applied must be reported on the Total Nitrogen Applied Report form as described in the Total Nitrogen Applied Report form instructions.

Total nitrogen applied includes any product containing any form or concentration of nitrogen including, but not limited to, organic and inorganic fertilizers, slow release products, compost, compost teas, manure, and extracts.

2. The Total Nitrogen Applied Report form includes the following information:
    a. General ranch information such as GeoTracker file numbers, name, location, acres.
    b. Nitrogen concentration of irrigation water
    c. Nitrogen applied in pounds per acre with irrigation water
    d. Nitrogen present in the soil
    e. Nitrogen applied with compost and amendments
    f. Specific crops grown
    g. Nitrogen applied in pounds per acre with fertilizers and other materials to each specific crop grown
    h. Crop acres of each specific crop grown
    i. Whether each specific crop was grown organically or conventionally
    j. Basis for the nitrogen applied
    k. Explanation and comments section
    l. Certification statement with penalty of perjury declaration
    m. Additional information regarding whether each specific crop was grown in a nursery, greenhouse, hydroponically, in containers, and similar variables.

PART 3. ANNUAL COMPLIANCE FORM

Tier 3 Dischargers must submit annual compliance information, electronically, on the Annual Compliance Form. The purpose of the electronic Annual Compliance Form is to provide information to the Central Coast Water Board to assist in the evaluation of threat to water quality from individual agricultural discharges of waste and measure progress towards water quality improvement and verify compliance with the Order and MRP. Time schedules are shown in Table 5.

A. Annual Compliance Form

1. **By March 1, 2018, and updated annually thereafter by March 1**, Tier 3 Dischargers must submit an Annual Compliance Form electronically, in a format specified by the Executive Officer. The electronic Annual Compliance Form includes, but is not limited to the following minimum requirements[1]:
    a. Question regarding consistency between the Annual Compliance Form and the electronic Notice of Intent (eNOI);
    b. Information regarding type and characteristics of discharge (e.g., number of discharge points, estimated flow/volume, number of tailwater days);
    c. Identification of any direct agricultural discharges to a stream, lake, estuary, bay, or ocean;
    d. Identification of specific farm water quality management practices completed, in progress, and planned to address water quality impacts caused by discharges of waste including irrigation management, pesticide management, nutrient management, salinity management, stormwater management, and sediment and erosion control to achieve compliance with this Order; and identification of specific methods used, and described in the Farm Plan consistent with Order Provision 44.g., for the purposes of assessing the effectiveness of management practices implemented and the outcomes of such assessments:
    e. Proprietary information question and justification;
    f. Authorization and certification statement and declaration of penalty of perjury.

PART 5. INDIVIDUAL SURFACE WATER DISCHARGE MONITORING AND REPORTING REQUIREMENTS

Monitoring and reporting requirements for individual surface water discharge identified in Part 5.A. and Part 5.B. apply to Tier 3 Dischargers with irrigation water or stormwater discharges to surface water from an outfall. Outfalls are locations where irrigation water and stormwater exit a farm/ranch, or otherwise leave the control of the discharger, after being conveyed by pipes, ditches, constructed swales, tile drains, containment structures, or other discrete structures or features that transport the water. Discharges that have commingled with discharges from another farm/ranch are considered to have left the control of the discharger. Key monitoring and reporting requirements for individual surface water discharge are shown in Tables 4A and 4B. Time schedules are shown in Table 5.

[1] Items reported in the Annual Compliance Form are due by March 1 2018, and annually thereafter, unless otherwise specified.

A. Individual Surface Water Discharge Monitoring

1. Tier 3 Dischargers must conduct individual surface water discharge monitoring to a) evaluate the quality of individual waste discharges, including concentration and load of waste (in kilograms per day) for appropriate parameters, b) evaluate effects of waste discharge on water quality and beneficial uses, and c) evaluate progress towards compliance with water quality improvement milestones in the Order.

Individual Sampling and Analysis Plan

2. **By March 1, 2018, or as directed by the Executive Officer**, Tier 3 Dischargers must submit an individual surface water discharge Sampling and Analysis Plan (SAAP) and QAPP to monitor individual discharges of irrigation water and stormwater that leaves their farm/ranch from an outfall. The Sampling and Analysis Plan and QAPP must be submitted to the Executive Officer; this requirement is satisfied if an approved SAAP and QAPP addressing all individual surface water discharge monitoring requirements described in this Order has been submitted pursuant to Order No.R3-2012-0011 and associated Monitoring and Reporting Programs.

3. The Sampling and Analysis Plan must include the following minimum required components to monitor irrigation water and stormwater discharges:
   a. Number and location of outfalls (identified with latitude and longitude or on a scaled map);
   b. Number and location of monitoring points;
   c. Description of typical irrigation runoff patterns;
   d. Map of discharge and monitoring points;
   e. Sample collection methods;
   f. Monitoring parameters;
   g. Monitoring schedule and frequency of monitoring events;

4. The QAPP must include appropriate methods for sampling, measurement and analysis, data collection or generation, data handling, quality control activities, and documentation.

5. The Sampling and Analysis Plan and QAPP, and any proposed revisions are subject to approval by the Executive Officer. The Executive Officer may require modifications to the Sampling and Analysis Plan or Tier 3 Dischargers may propose Sampling and Analysis Plan modifications for Executive Officer approval, when modifications are justified to accomplish the objectives of the MRP.

Individual Surface Water Discharge Monitoring Points

6. Tier 3 Dischargers must select monitoring points to characterize at least 80% of the estimated maximum irrigation run-off discharge volume from each farm/ranch based on that farm's/ranch's typical discharge patterns[1], including tailwater discharges and discharges from tile drains. Sample must be taken when irrigation activity is causing maximal run-off. Load estimates will be generated by multiplying flow volume of discharge by concentration of contaminants. Tier 3 Dischargers must include at least one monitoring point from each farm/ranch which drains areas where chlorpyrifos or diazinon are applied, and monitoring of runoff or tailwater must be conducted within one week of chemical application. If discharge is not routinely present, Discharger may characterize typical run-off patterns in the Annual Report. See Table 4A for additional details.

7. Tier 3 Dischargers must also monitor storage ponds and other terminal surface water containment structures that collect irrigation and stormwater runoff, unless the structure is (1) part of a tail-water return system where a major portion of the water in such structure is reapplied as irrigation water, or (2) the structure is primarily a sedimentation pond by design with a short hydraulic residence time (96 hours or less) and a discharge to surface water when functioning. If multiple ponds are present, sampling must cover at least those structures that would account for 80% of the maximum storage volume of the containment features. See Table 4B for additional details. Where water is reapplied as irrigation water. Dischargers shall document reuse in the Farm Plan.

Individual Surface Water Discharge Monitoring Parameters, Frequency, and Schedule

8. Tier 3 Dischargers must conduct monitoring for parameters, laboratory analytical methods, frequency and schedule described in Tables 4A and 4B. Dischargers may utilize in-field water testing instruments/equipment as a substitute for laboratory analytical methods if the method is approved by U.S. EPA, meets reporting limits (RL) and practical quantitation limits (PQL) specifications in the MRP, and appropriate sampling methodology and quality assurance checks can be applied to ensure that QAPP standards are met to ensure accuracy of the test.

[1] The requirement to select monitoring points to characterize at least 80% of the estimated maximum irrigation run-off based on typical discharge patterns is for the purposes of attempting to collect samples that represent a majority of the volume of irrigation run-off discharged; however the Board recognizes that predetermining these locations is not always possible and that sampling results may vary. The MRP does not specify the number or location of monitoring points to provide maximum flexibility for growers to determine how many sites necessary and exact locations are given the anticipated site-specific conditions.

9. Tier 3 Dischargers must initiate individual surface water discharge monitoring per an approved Sampling and Analysis Plan and QAPP, unless otherwise directed by the Executive Officer.

B. Individual Surface Water Discharge Reporting

Individual Surface Water Discharge Monitoring Data Submittal

By March 1, 2018, and annually thereafter by March 1, Tier 3 Dischargers must submit individual surface water discharge monitoring data and information to the Central Coast Water Board electronically, in a pdf format, containing at least the following items, or as otherwise approved by the Executive Officer:

a. Electronic laboratory data
- All reports of results must contain Ranch name and Global ID, site name(s), project contact, and date.
- Electronic laboratory data reports of chemical results shall include analytical results, as well as associated quality assurance data including method detection limits, reporting limits, matrix spikes, matrix spike duplicates, laboratory blanks, and other quality assurance results required by the analysis method.
- Electronic laboratory data reports of toxicity results shall include summary results comparable to those required in a CEDEN file delivery, including test and control results. For each test result, the mean, associated control performance, calculated percent of control, statistical test results and determination of toxicity, must be included. Test results must specify the control ID used to calculate statistical outcomes.
- Field data results, including temperature, pH, conductivity, turbidity and flow measurements, any field duplicates or blanks, and field observations.
- Calculations of un-ionized ammonia concentrations
- Calculations of total flow and pollutant loading (for nitrate, pesticides if sampled, total ammonia, and turbidity) (include formulas);

b. Narrative description of typical irrigation runoff patterns;
c. Location of sampling sites and map(s);
d. Sampling and analytical methods used;
e. Specify the method used to obtain flow at each monitoring site during each monitoring event;
f. Photos obtained from all monitoring sites, clearly labeled with location and date;
g. Sample chain-of-custody forms do not need to be submitted but must be made available to Central Coast Water Board staff, upon request.

PART 6. IRRIGATION AND NUTRIENT MANAGEMENT PLAN

Monitoring and reporting requirements related to the Irrigation and Nutrient Management Plan (INMP) identified in Part 6.A., and 6.B, apply to Tier 3 Dischargers identified by the Executive Officer that are newly enrolled in Order No. R3-2017-0002, and Tier 3 Dischargers that were subject to Irrigation and Nutrient Management Plan Requirements in Order R3-2012-0011 per MRP Order No. R3-2012-0011-03 Time schedules are shown in Table 5.

A. Irrigation and Nutrient Management Plan Monitoring

1. Tier 3 Dischargers required in Order No. R3-2012-0011 to develop and initiate implementation of an Irrigation and Nutrient Management Plan (INMP) certified by a Professional Soil Scientist, Professional Agronomist, or Crop Advisor certified by the American Society of Agronomy, or similarly qualified professional, are required to update (as necessary) and implement their INMP throughout the term of this Order.

2. The Executive Officer will assess whether an INMP is required for new Tier 3 Dischargers that enroll in Order No. R3-2017-0002 during the term of the Order. The Executive Officer will use the criteria established in Order No. R3-2012-0011 to make this assessment. If a Tier 3 Discharger is required to develop an INMP, the Tier 3 discharger must develop and initiate implementation of an Irrigation and Nutrient Management Plan (INMP) certified by a Professional Soil Scientist, Professional Agronomist, or Crop Advisor certified by the American Society of Agronomy, or similarly qualified professional, **within 18 months** of the Executive Officer's assessment of the INMP requirement.
3. The purpose of the INMP is to budget and manage the nutrients applied to each farm/ranch considering all sources of nutrients, crop requirements, soil types, climate, and local conditions in order to minimize nitrate loading to surface water and groundwater in compliance with this Order. The professional certification of the INMP must indicate that the relevant expert has reviewed all necessary documentation and testing results, evaluated total nitrogen applied relative to typical crop nitrogen uptake and nitrogen removed at harvest, with consideration to potential nitrate loading to groundwater, and conducted field verification to ensure accuracy of reporting.
4. Tier 3 Dischargers required to develop and initiate implementation an (INMP) must include the following elements in the INMP. The INMP is not submitted to the Central Coast Water Board, with the exception of the INMP Effectiveness Report:
    a. Proof of INMP certification;
    b. Map locating each farm/ranch;
    c. Identification of crop nitrogen uptake values for use in nutrient balance calculations;

d. Record keeping annually by either Method 1 or Method 2:

e. To meet the requirement to record total nitrogen in the soil,dischargers may take a nitrogen soil sample (e.g. laboratory analysis or nitrate quick test) or use an alternative method to evaluate nitrogen content in soil, prior to planting or seeding the field or prior to the time of pre-sidedressing, or at an alternative time when it is most effective to determine nitrogen present in the soil that is available for the next crop and to minimize nitrate leaching to groundwater. The amount of nitrogen remaining in the soil must be accounted for as a source of nitrogen when budgeting, and the soil sample or alternative method results must be maintained in the INMP.

f. Identification of irrigation and nutrient management practices in progress (identify start date), completed (identify completion date), and planned (identify anticipated start date) to reduce nitrate loading to groundwater to achieve compliance with this Order.

g. Description of methods Discharger will use to verify overall effectiveness of the INMP.

5. Tier 3 Dischargers must evaluate the effectiveness of the INMP. Irrigation and Nutrient Management Plan effectiveness monitoring must evaluate reduction in new nitrogen[1] loading potential based on minimized fertilizer use and improved irrigation and nutrient management practices in order to minimize new nitrogen loading to surface water and groundwater. Evaluation methods used may include, but are not limited to analysis of groundwater well monitoring data or soil sample data, or analysis of trends in new nitrogen application data.

B. Irrigation and Nutrient Management Plan Reporting

1. **By March 1, 2019**, Tier 3 Dischargers required to develop and initiate implementation of an INMP must submit an INMP Effectiveness Report to evaluate reductions in nitrate loading to surface water and groundwater based on the implementation of irrigation and nutrient management practices in a format specified by the Executive Officer. Dischargers in the same groundwater basin or subbasin may choose to comply with this requirement as a group by submitting a single report that evaluates the overall effectiveness of the broad scale implementation of irrigation and nutrient management practices identified in individual INMPs to protect groundwater. Group efforts must use data from each farm/ranch (e.g., data from individual groundwater wells, soil samples, or nitrogen application). The INMP

[1] New nitrogen is nitrogen from fertilizers, amendments, and other nitrogen sources applied other than nitrogen present in groundwater.

Effectiveness Report must include a description of the methodology used to evaluate and verify effectiveness of the INMP.

PART 7. WATER QUALITY BUFFER PLAN

Monitoring and reporting requirements related to the Water Quality Buffer Plan identified in Part 7.A. and Part 7.B. apply to Tier 3 Dischargers that have farms/ranches *that contain or are adjacent to waterbody identified on the List of Impaired Waterbodies as impaired for temperature, turbidity, or sediment).* Time schedules are shown in Table 5.

A. **Water Quality Buffer Plan**

1. **By 18 months following enrollment in Order No. R3-2017-0002 of a Tier 3 farm/ranch**, Tier 3 Dischargers adjacent to or containing a waterbody identified on the List of Impaired Waterbodies as impaired for temperature, turbidity or sediment must submit a Water Quality Buffer Plan (WQBP) to the Executive Officer that protects the listed waterbody and its associated perennial and intermittent tributaries. The purpose of the Water Quality Buffer Plan is to prevent waste discharge, comply with water quality standards (e.g., temperature, turbidity, sediment), and protect beneficial uses in compliance with this Order and the following Basin Plan requirement:

   Basin Plan (Chapter 5, p. V-13, Section V.G.4 – Erosion and Sedimentation, *"A filter strip of appropriate width, and consisting of undisturbed soil and riparian vegetation or its equivalent, must be maintained, wherever possible, between significant land disturbance activities and watercourses, lakes, bays, estuaries, marshes, and other water bodies. For construction activities, minimum width of the filter strip must be thirty feet, wherever possible…."*

2. The Water Quality Buffer Plan must include the following or the functional equivalent, to address discharges of waste and associated water quality impairments:

   a. A minimum 30 foot buffer (as measured horizontally from the top of bank on either side of the waterway, or from the high water mark of a lake and mean high tide of an estuary);
   b. Any necessary increases in buffer width to adequately prevent the discharge of waste that may cause or contribute to any excursion above or outside the acceptable range for any Regional, State, or Federal numeric or narrative water quality standard (e.g., temperature, turbidity);

   c. Any buffer less than 30 feet must provide equivalent water quality protection and be justified based on an analysis of site-specific conditions and be approved by the Executive Officer;
   d. Identification of any alternatives implemented to comply with this requirement, that are functionally equivalent to described buffer;
   e. Schedule for implementation;
   f. Maintenance provisions to ensure water quality protection;
   g. Annual photo monitoring;

2. The WQPB must be submitted using the Water Quality Buffer Plan form, or, if an alternative to the WQBP is submitted, in a format approved by the Executive Officer.

3. **By March 1, 2019**, Tier 3 Dischargers that submitted a WQBP pursuant to Order No. R3-2012-0011 or Order No. R3-2017-0002, are required to update (as necessary) and implement their WQBP, and annually submit a WQBP Status Report of their WQBP implementation using the Water Quality Buffer Plan form, or, if an alternative to the WQBP was submitted, an Alternative to WQBP Status Report, electronically, in a format approved by the Executive Officer.

PART 8. GENERAL MONITORING AND REPORTING REQUIREMENTS

A. Submittal of Technical Reports

1. Dischargers must submit reports in a format specified by the Executive Officer (reports will be submitted electronically, unless otherwise specified by the Executive Officer). A transmittal letter must accompany each report, containing the following penalty of perjury statement signed by the Discharger or the Discharger's authorized agent:

   "In compliance with Water Code §*13267, I certify under penalty of perjury that this document and all attachments were prepared by me, or under my direction or supervision following a system designed to assure that qualified personnel properly gather and evaluate the information submitted. To the best of my knowledge and belief, this document and all attachments are true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment".*

2. If the Discharger asserts that all or a portion of a report submitted pursuant to this Order is subject to an exemption from public disclosure (e.g. trade secrets or secret processes), the Discharger must provide an explanation of how those portions of the reports are exempt from public disclosure. The

Discharger must clearly indicate on the cover of the report (typically an electronic submittal) that the Discharger asserts that all or a portion of the report is exempt from public disclosure, submit a complete report with those portions that are asserted to be exempt in redacted form, submit separately (in a separate electronic file) unredacted pages (to be maintained separately by staff). The Central Coast Water Board staff will determine whether any such report or portion of a report qualifies for an exemption from public disclosure. If the Central Coast Water Board staff disagrees with the asserted exemption from public disclosure, the Central Coast Water Board staff will notify the Discharger prior to making such report or portions of such report available for public inspection.

B. Central Coast Water Board Authority

1. Monitoring reports are required pursuant to section 13267 of the California Water Code. Pursuant to section 13268 of the Water Code, a violation of a request made pursuant to section 13267 may subject you to civil liability of up to $1000 per day.

2. The Water Board needs the required information to determine compliance with Order No.R3-2017-0002. The evidence supporting these requirements is included in the findings of Order No.R3-2017-0002.

____
John M. Robertson
Executive Officer

____
Date

Table 1. Major Waterbodies in Agricultural Areas[1]

Hydrologic SubArea	Waterbody Name	Hydrologic SubArea	Waterbody Name
30510	Pajaro River	30920	Quail Creek
30510	Salsipuedes Creek	30920	Salinas Reclamation Canal
30510	Watsonville Slough	31022	Chorro Creek
30510	Watsonville Creek[2]	31023	Los Osos Creek
30510	Beach Road Ditch[2]	31023	Warden Creek
30530	Carnadero Creek	31024	San Luis Obispo Creek
30530	Furlong Creek[2]	31024	Prefumo Creek
30530	Llagas Creek	31031	Arroyo Grande Creek
30530	Miller's Canal	31031	Los Berros Creek
30530	San Juan Creek	31210	Bradley Canyon Creek
30530	Tesquisquita Slough	31210	Bradley Channel
30600	Moro Cojo Slough	31210	Green Valley Creek
30910	Alisal Slough	31210	Main Street Canal
30910	Blanco Drain	31210	Orcutt Solomon Creek
30910	Old Salinas River	31210	Oso Flaco Creek
30910	Salinas River (below Gonzales Rd.)	31210	Little Oso Flaco Creek
30920	Salinas River (above Gonzales Rd. and below Nacimiento R.)	31210	Santa Maria River
30910	Santa Rita Creek[2]	31310	San Antonio Creek[2]
30910	Tembladero Slough	31410	Santa Ynez River
30920	Alisal Creek	31531	Bell Creek
30920	Chualar Creek	31531	Glenn Annie Creek
30920	Espinosa Slough	31531	Los Carneros Creek[2]
30920	Gabilan Creek	31534	Arroyo Paredon Creek
30920	Natividad Creek	31534	Franklin Creek

[1] At a minimum, monitoring sites must be included for these waterbodies in agricultural areas, unless otherwise approved by the Executive Officer. Monitoring sites may be proposed for addition or modification to better assess the impacts of waste discharges from irrigated lands to surface water. Dischargers choosing to comply with surface receiving water quality monitoring, individually (not part of a cooperative monitoring program) must only monitor sites for waterbodies receiving the discharge.
[2] These creeks are included because they are newly listed waterbodies on the 2010 303(d) list of Impaired Waters that are associated with areas of agricultural discharge.

Table 2. Surface Receiving Water Quality Monitoring Parameters

Parameters and Tests	RL[3]	Monitoring Frequency[1]
Photo Monitoring		
Upstream and downstream photographs at monitoring location		With every monitoring event
WATER COLUMN SAMPLING		
Physical Parameters and General Chemistry		
Flow (field measure) (CFS) following SWAMP field SOP[9]	.25	Monthly, including 2 stormwater events
pH (field measure)	0.1	”
Electrical Conductivity (field measure) (µS/cm)	2.5	”
Dissolved Oxygen (field measure) (mg/L)	0.1	”
Temperature (field measure) (°C)	0.1	”
Turbidity (NTU)	0.5	”
Total Dissolved Solids (mg/L)	10	”
Total Suspended Solids (mg/L)	0.5	”
Nutrients		
Total Nitrogen (mg/L)	0.5	Monthly, including 2 stormwater events
Nitrate + Nitrite (as N) (mg/L)	0.1	”
Total Ammonia (mg/L)	0.1	”
Unionized Ammonia (calculated value, mg/L))		”
Total Phosphorus (as P) (mg/L)	0.02	
Soluble Orthophosphate (mg/L)	0.01	”
Water column chlorophyll a (µg/L)	1.0	“
Algae cover, Floating Mats, % coverage	-	“
Algae cover, Attached, % coverage	-	“
Water Column Toxicity Test		
Algae - *Selenastrum capricornutum (*96-hour chronic; Method1003.0 in EPA/821/R-02/013)	-	4 times each year, twice in dry season, twice in wet season
Water Flea – *Ceriodaphnia dubia* (7-day chronic; Method 1002.0 in EPA/821/R-02/013)	-	”
Midge - *Chironomus spp.* (96-hour acute; Alternate test species in EPA 821-R-02-012)	-	“

Parameters and Tests	RL[3]	Monitoring Frequency[1]
Toxicity Identification Evaluation (TIE)	-	As directed by Executive Officer
Pesticides[2] /Herbicides (µg/L)		
Organophosphate Pesticides		
Azinphos-methyl	0.02	2 times in both 2017 and 2018, once in dry season and once in wet season of each year, concurrent with water toxicity monitoring
Chlorpyrifos	0.005	”
Diazinon	0.005	”
Dichlorvos	0.01	”
Dimethoate	0.01	”
Dimeton-s	0.005	”
Disulfoton (Disyton)	0.005	”
Malathion	0.005	”
Methamidophos	0.02	”
Methidathion	0.02	“
Parathion-methyl	0.02	“
Phorate	0.01	“
Phosmet	0.02	“
Neonicotinoids		
Thiamethoxam	.002	“
Imidacloprid	.002	“
Thiacloprid	.002	“
Dinotefuran	.006	“
Acetamiprid	.01	“
Clothianidin	.02	
Herbicides		
Atrazine	0.05	“
Cyanazine	0.20	“
Diuron	0.05	“
Glyphosate	2.0	“
Linuron	0.1	“
Paraquat	0.20	“
Simazine	0.05	“
Trifluralin	0.05	“
Metals (µg/L)		
Arsenic (total) [5,7]	0.3	2 times in both 2017 and 2018, once in dry season and once in wet season of each year, concurrent with water toxicity monitoring
Boron (total) [6,7]	10	“
Cadmium (total & dissolved) [4.5,7]	0.01	“

Parameters and Tests	RL[3]	Monitoring Frequency[1]
Copper (total and dissolved) [4,7]	0.01	“
Lead (total and dissolved) [4,7]	0.01	“
Nickel (total and dissolved) [4,7]	0.02	“
Molybdenum (total) [7]	1	“
Selenium (total)[7]	0.30	“
Zinc (total and dissolved) [4.5,7]	0.10	“
Other (µg/L)		
Total Phenolic Compounds[8]	5	2 times in 2017, once in spring (April-May) and once in fall (August-September)
Hardness (mg/L as CaCO3)	1	“
Total Organic Carbon (ug/L)	0.6	“
<u>SEDIMENT SAMPLING</u>		
Sediment Toxicity - *Hyalella azteca* 10-day static renewal (EPA, 2000)		2 times each year, once in spring (April-May) and once in fall (August-September)
Pyrethroid Pesticides in Sediment (µg/kg)		
Gamma-cyhalothrin	2	2 times in both 2017 and 2018, once in spring (April-May) and once in fall (August-September) of each year, concurrent with sediment toxicity sampling
Lambda-cyhalothrin	2	“
Bifenthrin	2	“
Beta-cyfluthrin	2	“
Cyfluthrin	2	“
Esfenvalerate	2	“
Permethrin	2	“
Cypermethrin	2	“
Danitol	2	“
Fenvalerate	2	“
Fluvalinate	2	“
Other Monitoring in Sediment		
Chlorpyrifos (µg/kg)	2	“
Total Organic Carbon	0.01%	“
		“
Sediment Grain Size Analysis	1%	“

[1]Monitoring is ongoing through all five years of the Order, unless otherwise specified. Monitoring frequency may be used as a guide for developing alternative Sampling and Analysis Plan.
[2]Pesticide list may be modified based on specific pesticide use in Central Coast Region. Analytes on this list must be reported, at a minimum.
[3] Reporting Limit, taken from SWAMP where applicable.

[4] Holmgren, Meyer, Cheney and Daniels. 1993. Cadmium, Lead, Zinc, Copper and Nickel in Agricultural Soils of the United States. J. of Environ. Quality 22:335-348.
[5]Sax and Lewis, ed. 1987. Hawley's Condensed Chemical Dictionary. 11th ed. New York: Van Nostrand Reinhold Co., 1987. Zinc arsenate is an insecticide.
[6]Http://www.coastalagro.com/products/labels/9%25BORON.pdf; Boron is applied directly or as a component of fertilizers as a plant nutrient.
[7]Madramootoo, Johnston, Willardson, eds. 1997. Management of Agricultural Drainage Water Quality. International Commission on Irrigation and Drainage. U.N. FAO. SBN 92-6-104058.3.
[8]http://cat.inist.fr/?aModele=afficheN&cpsidt=14074525; Phenols are breakdown products of herbicides and pesticides. Phenols can be directly toxic and cause endocrine disruption.
[9]See SWAMP field measures SOP, p. 17
mg/L – milligrams per liter; ug/L – micrograms per liter; ug/kg – micrograms per kilogram;
NTU – Nephelometric Turbidity Units; CFS – cubic feet per second;

Table 3. Groundwater Monitoring Parameters

Parameter	RL	Analytical Method[3]	Units
pH	0.1	Field or Laboratory Measurement EPA General Methods	pH Units
Specific Conductance	2.5		µS/cm
Total Dissolved Solids	10		mg/L
Total Alkalinity as $CaCO_3$	1	EPA Method 310.1 or 310.2	
Calcium	0.05	General Cations[1] EPA 200.7, 200.8, 200.9	
Magnesium	0.02		
Sodium	0.1		
Potassium	0.1		
Sulfate (SO_4)	1.0	General Anions EPA Method 300 or EPA Method 353.2	
Chloride	0.1		
Nitrate + Nitrite (as N)[2] *or* Nitrate as N	0.1		

[1]General chemistry parameters (major cations and anions) represent geochemistry of water bearing zone and assist in evaluating quality assurance/quality control of groundwater monitoring and laboratory analysis.
[2]The MRP allows analysis of "nitrate plus nitrite" to represent nitrate concentrations (as N). The "nitrate plus nitrite" analysis allows for extended laboratory holding times and relieves the Discharger of meeting the short holding time required for nitrate.
[3]Dischargers may use alternative analytical methods approved by EPA.
RL – Reporting Limit; µS/cm – micro siemens per centimeter

Table 4A. Individual Discharge Monitoring for Tailwater, Tile drain, and Stormwater Discharges

Parameter	Analytical Method[1]	Maximum PQL	Units	Min Monitoring Frequency
Discharge Flow or Volume	Field Measure	---	CFS	(a) (d)
Approximate Duration of Flow	Calculation	---	hours/month	
Temperature (water)	Field Measure	0.1	^{o} Celsius	
pH	Field Measure	0.1	pH units	

Electrical Conductivity	Field Measure	100	µS/cm	
Turbidity	SM 2130B, EPA 180.1	1	NTUs	
Nitrate + Nitrite (as N)	EPA 300.1, EPA 353.2	0.1	mg/L	
Ammonia	SM 4500 NH3, EPA 350.3	0.1	mg/L	
Chlorpyrifos[2]	EPA 8141A, EPA 614	0.02	ug/L	(b) (c) (d)
Diazinon[2]				
Ceriodaphnia Toxicity (96-hr acute)	EPA-821-R-02-012	NA	% Survival	
Hyalella Toxicity in Water (96-hr acute)	EPA-821-R-02-012	NA	% Survival	

[1] In-field water testing instruments/equipment as a substitute for laboratory analysis if the method is approved by EPA, meets RL/PQL specifications in the MRP, and appropriate sampling methodology and quality assurance checks can be applied to ensure that QAPP standards are met to ensure accuracy of the test.
[2]If chlorpyrifos or diazinon is used at the farm/ranch, otherwise does not apply. The Executive Officer may require monitoring of other pesticides based on results of downstream receiving water monitoring.
(a) Two times per year during primary irrigation season for farms/ranches less than or equal to 500 acres, and four times per year during primary irrigation season for farms/ranches greater than 500 acres. Executive Officer may reduce sampling frequency based on water quality improvements.
(b) Once per year during primary irrigation season for farms/ranches less than or equal to 500 acres, and two times per year during primary irrigation season for farms/ranches greater than 500 acres.
(c) Sample must be collected within one week of chemical application, if chemical is applied on farm/ranch;
(d) Once per year during wet season (October – March) for farms/ranches less than or equal to 500 acres, and two times per year during wet season for farms/ranches greater than 500 acres, within 18 hours of major storm events;
CFS – Cubic feet per second; NTU – Nephelometric turbidity unit; PQL – Practical Quantitation Limit;
NA – Not applicable

Table 4B. Individual Discharge Monitoring for Tailwater Ponds and other Surface Containment Features

Parameter	Analytical Method[1]	Maximum PQL	Units	Minimum Monitoring Frequency
Volume of Pond	Field Measure	1	Gallons	(a) (d)
Nitrate + Nitrite (as N)	EPA 300.1, EPA 353.2	50	mg/L	

[1] In-field water testing instruments/equipment as a substitute for laboratory analysis if the method is approved by EPA, meets RL/PQL specifications in the MRP, and appropriate sampling methodology and quality assurance checks can be applied to ensure that QAPP standards are met to ensure accuracy of the test.
(a) Four times per year during primary irrigation season; Executive Officer may reduce monitoring frequency based on water quality improvements.
(d) Two times per year during wet season (October – March, within 18 hours of major storm events)

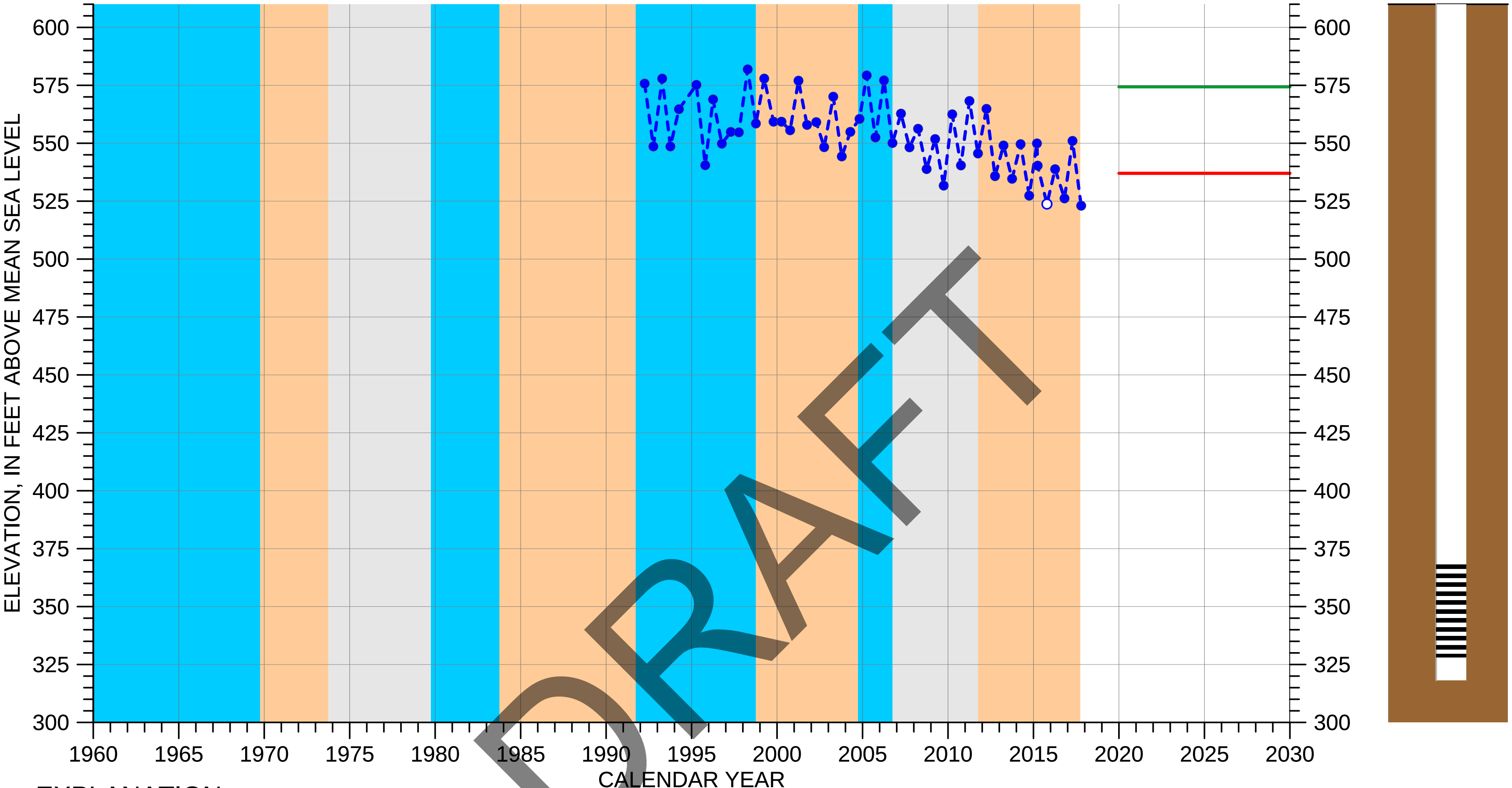
Table 5. Tier 3 - Time Schedule for Key Monitoring and Reporting Requirements (MRPs)

REQUIREMENT	TIME SCHEDULE[1]
Submit Sampling And Analysis Plan and Quality Assurance Project Plan (SAAP/QAPP) for Surface Receiving Water Quality Monitoring (*individually or*	By March 1, 2018, or as directed by the Executive Officer; satisfied if an approved SAAP/QAPP has been submitted pursuant

through cooperative monitoring program)	to Order No. R3-2012-0011 and associated MRPs
Initiate surface receiving water quality monitoring (*individually or through cooperative monitoring program*)	Per an approved SAAP and QAPP
Submit surface receiving water quality monitoring data (*individually or through cooperative monitoring program*)	Each January 1, April 1, July 1, and October 1
Submit surface receiving water quality Annual Monitoring Report (*individually or through cooperative monitoring program*)	By July 1 2017; annually thereafter by July 1
Initiate monitoring of groundwater wells	First sample from March-June 2017, second sample from September-December 2017
Submit individual surface water discharge SAAP and QAPP	By March 1, 2018 or as directed by the Executive Officer; waived if an approved SAAP and QAPP has been submitted and being implemented pursuant to Order No. R3-2012-0011.
Initiate individual surface water discharge monitoring	As described in an approved SAAP and QAPP
Submit individual surface water discharge monitoring data	March 1, 2018, and every March 1 annually thereafter
Submit electronic Annual Compliance Form	March 1, 2018 and every March 1 annually thereafter
Submit groundwater monitoring results	Within 60 days of the sample collection
Submit Water Quality Buffer Plan or alternative	Within 18 months of enrolling new Tier 3 farm/ranch in Order
Submit Status Report on Water Quality Buffer Plan or alternative	March 1, 2019
Tier 3 Dischargers with farms/ranches growing high risk crops:	
Report total nitrogen applied on the Total Nitrogen Applied form	March 1, 2018 and every March 1 annually thereafter
Submit INMP Effectiveness Report	March 1, 2019

[1] Dates are relative to adoption of this Order, unless otherwise specified.

APPENDIX G
PASO ROBLES FORMATION AQUIFER RMS HYDROGRAPHS AND WELL DATA



EXPLANATION

GROUNDWATER ELEVATION

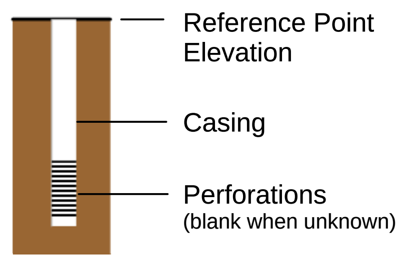
MEASUREMENT NOT VERIFIED*

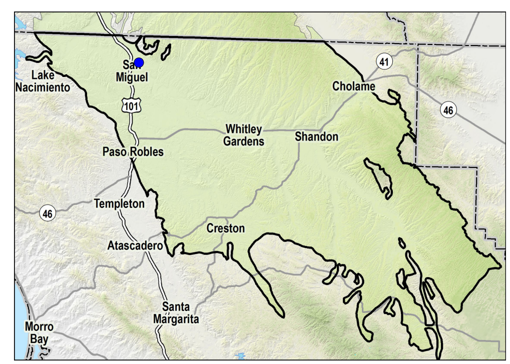
MEASURABLE OBJECTIVE

MINIMUM THRESHOLD

CLIMATE PERIOD CLASSIFICATION

DRY | AVERAGE/ALTERNATING | WET





Well Depth: 350 feet
Screened Interval: 300-310, 330-340 feet below ground surface
Reference Point Elevation: 669.8 feet above mean sea level

* Measurement reported as not static

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 25S/12E-16K05

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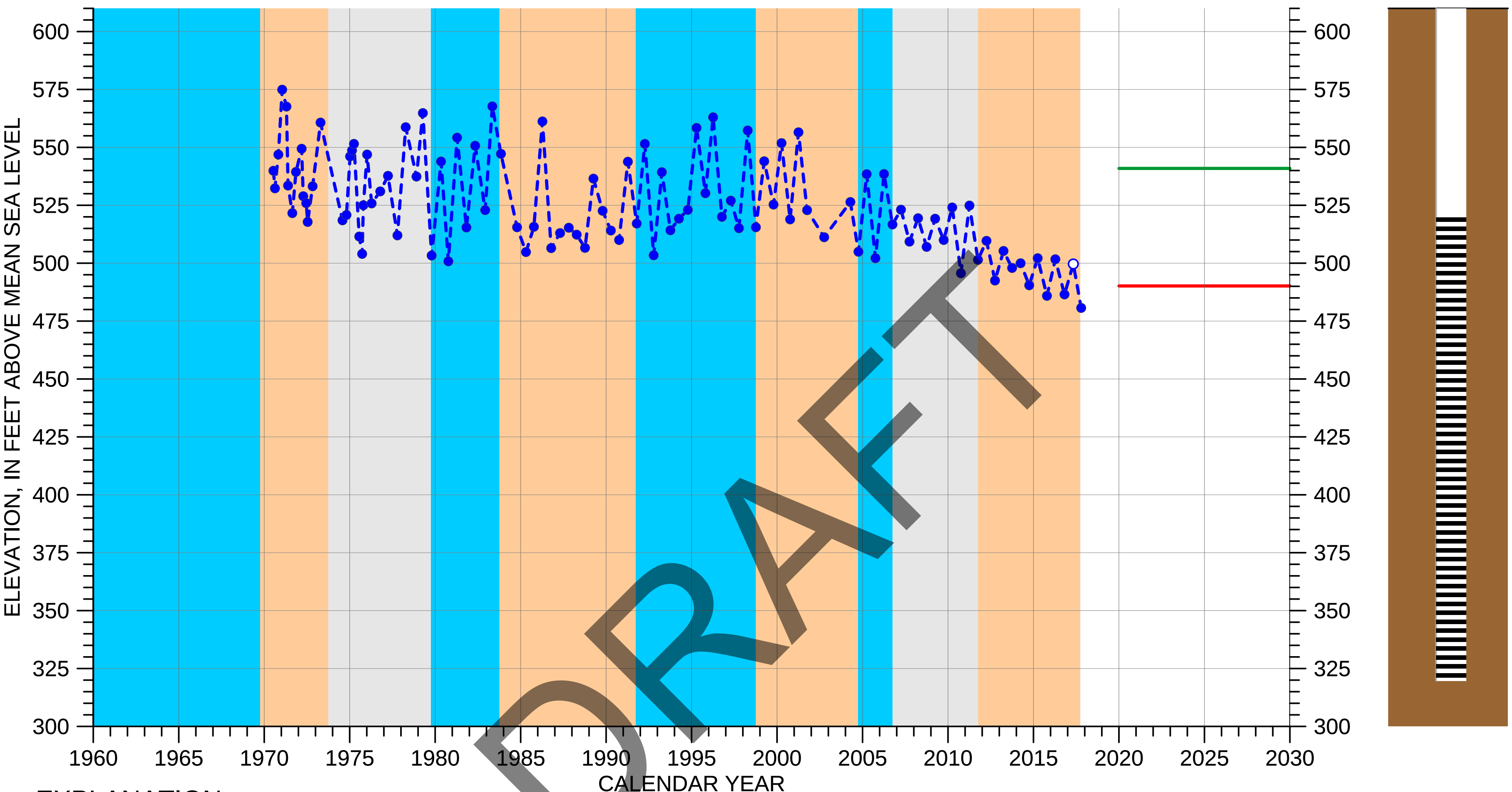
S:\projects\9200_Paso Robles GSP\SMC\Data\Figures\Hydrographs\grf\AppendixG\Fig01_25S_12E-16K05.grf



EXPLANATION

GROUNDWATER ELEVATION

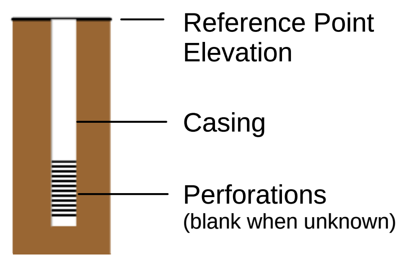
MEASUREMENT NOT VERIFIED*

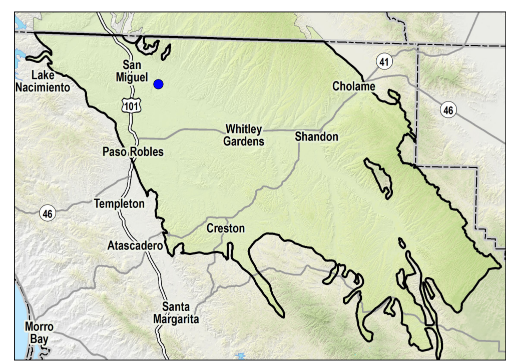
MEASURABLE OBJECTIVE

MINIMUM THRESHOLD

CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET





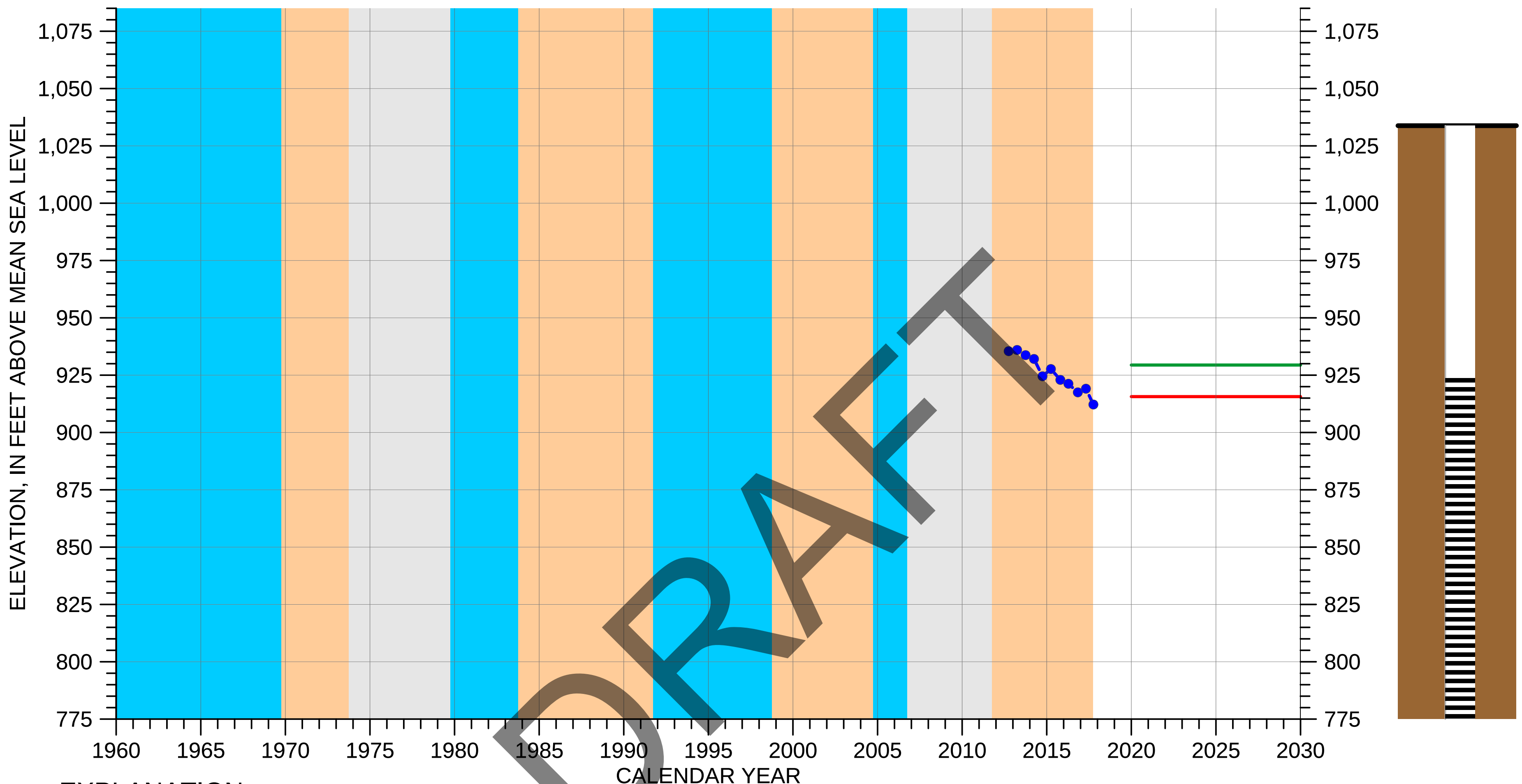
Well Depth: 400 feet
Screened Interval: 200-400 feet below ground surface
Reference Point Elevation: 719.7 feet above mean sea level

* Measurement reported as not static

MONTGOMERY & ASSOCIATES

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 25S/12E-26L01

S:\projects\9200_Paso Robles GSP\SMC\Data\Figures\Hydrographs\grf\AppendixG\Fig03_25S_12E-26L01.grf



EXPLANATION

GROUNDWATER ELEVATION

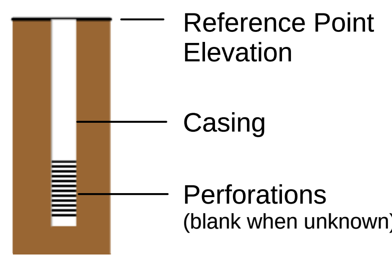
MEASUREMENT NOT VERIFIED*

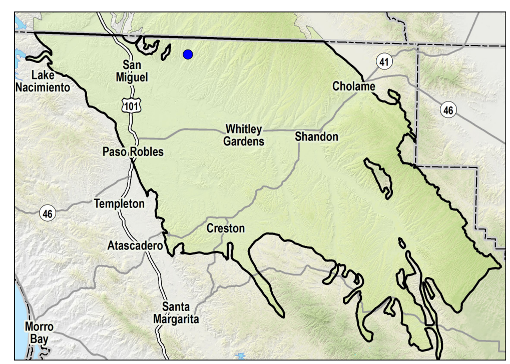
MEASURABLE OBJECTIVE

MINIMUM THRESHOLD

CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET





Well Depth: 270 feet
Screened Interval: 110-270 feet below ground surface
Reference Point Elevation: 1033.8 feet above mean sea level

* Measurement reported as not static

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 25S/13E-08L02

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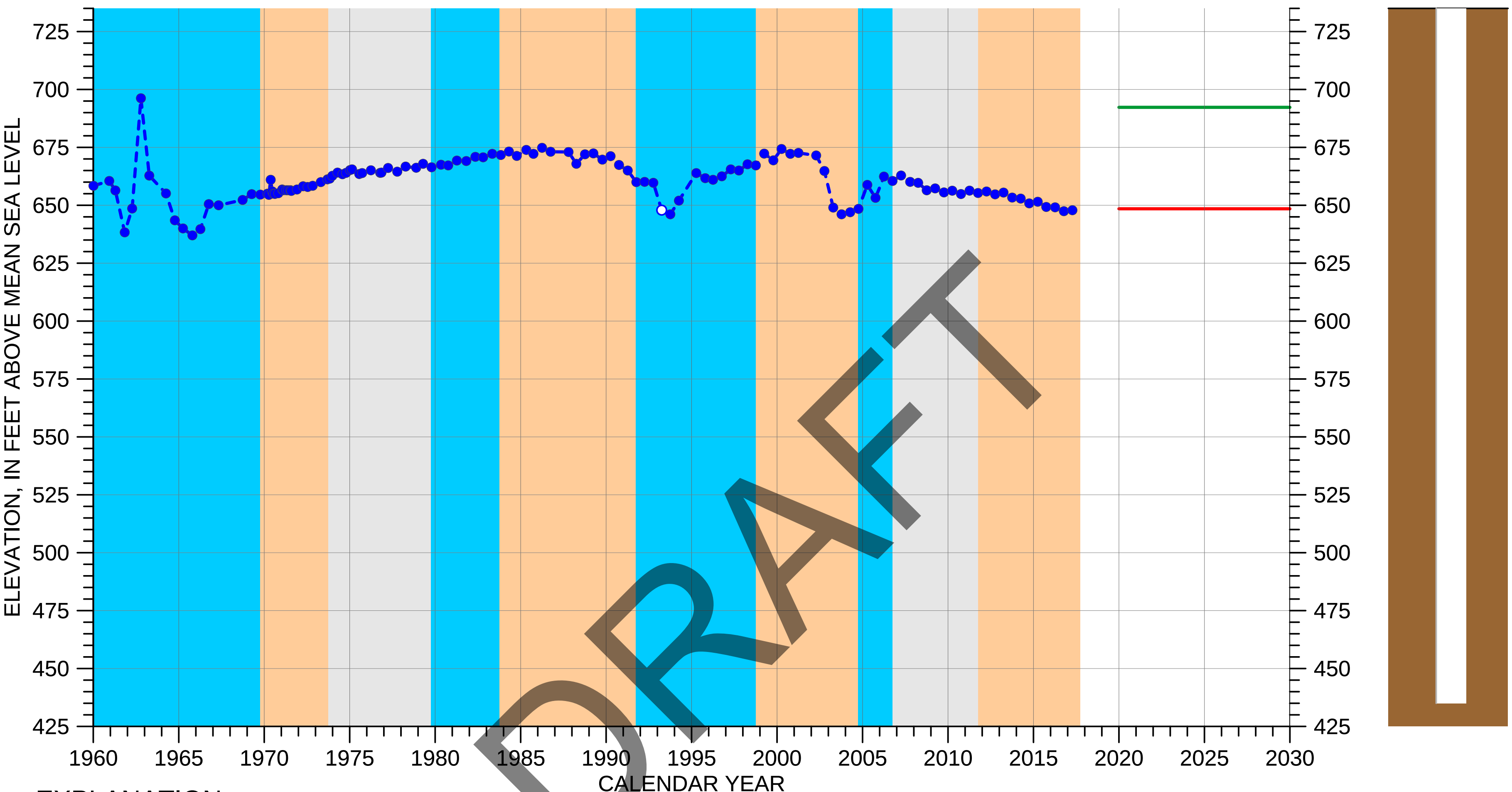
S:\projects\9200_Paso Robles GSP\SMC\Data\Figures\Hydrographs\grf\AppendixG\Fig04_25S_13E-08L02.grf



EXPLANATION

GROUNDWATER ELEVATION

MEASUREMENT NOT VERIFIED*

MEASURABLE OBJECTIVE

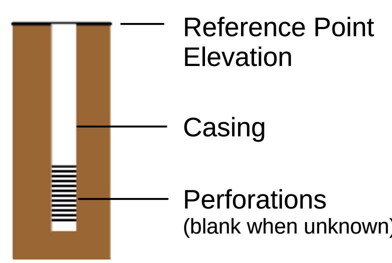
MINIMUM THRESHOLD

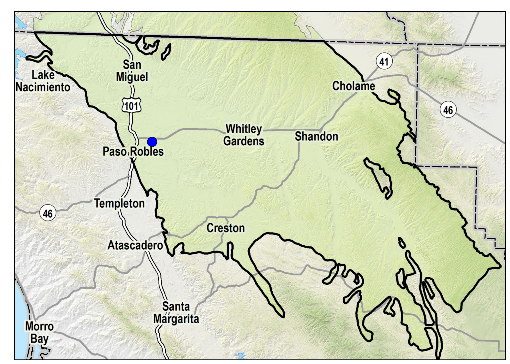
CLIMATE PERIOD CLASSIFICATION

DRY

AVERAGE/ALTERNATING

WET





Well Depth: 400 feet
Screened Interval: unknown
Reference Point Elevation: 835 feet above mean sea level

* Measurement reported as not static

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 26S/12E-26E07

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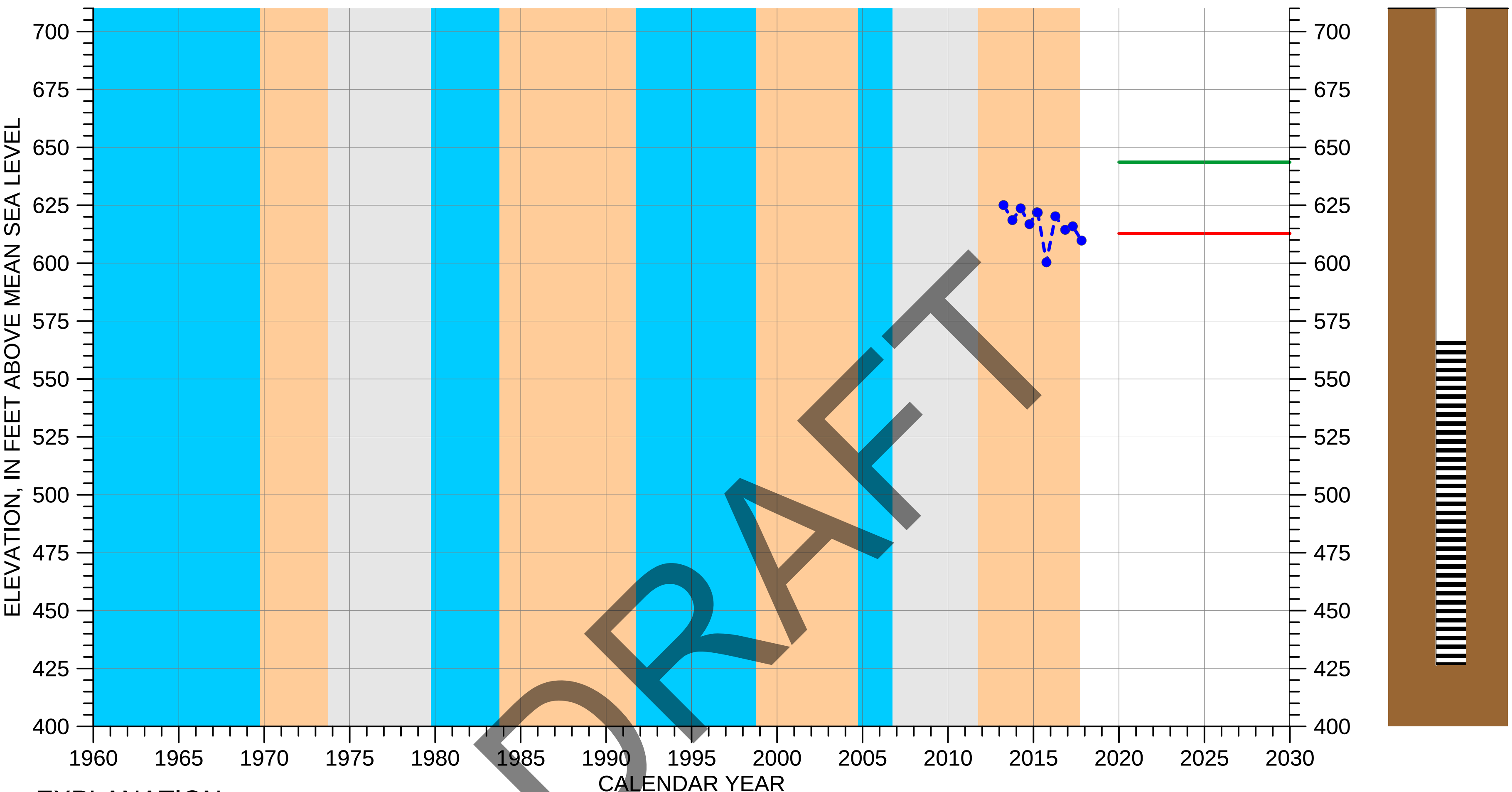
S:\projects\9200_Paso Robles GSP\SMC\Data\Figures\Hydrographs\grf\AppendixG\Fig05_26S_12E-26E07.grf



EXPLANATION

GROUNDWATER ELEVATION

MEASUREMENT NOT VERIFIED*

MEASURABLE OBJECTIVE

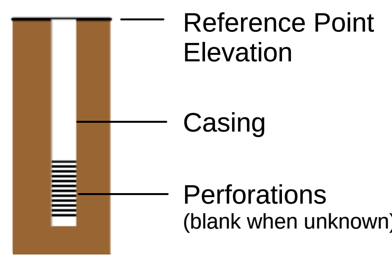
MINIMUM THRESHOLD

CLIMATE PERIOD CLASSIFICATION

DRY

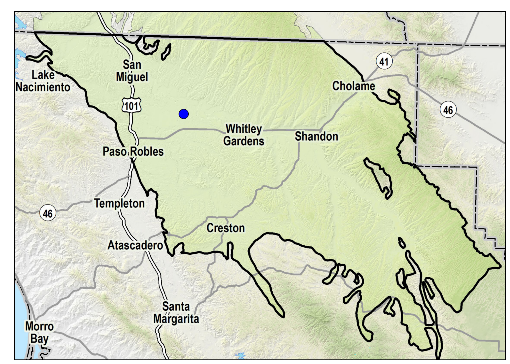
AVERAGE/ALTERNATING

WET



Well Depth: 400 feet
Screened Interval: 260-400 feet below ground surface
Reference Point Elevation: 827.9 feet above mean sea level

* Measurement reported as not static



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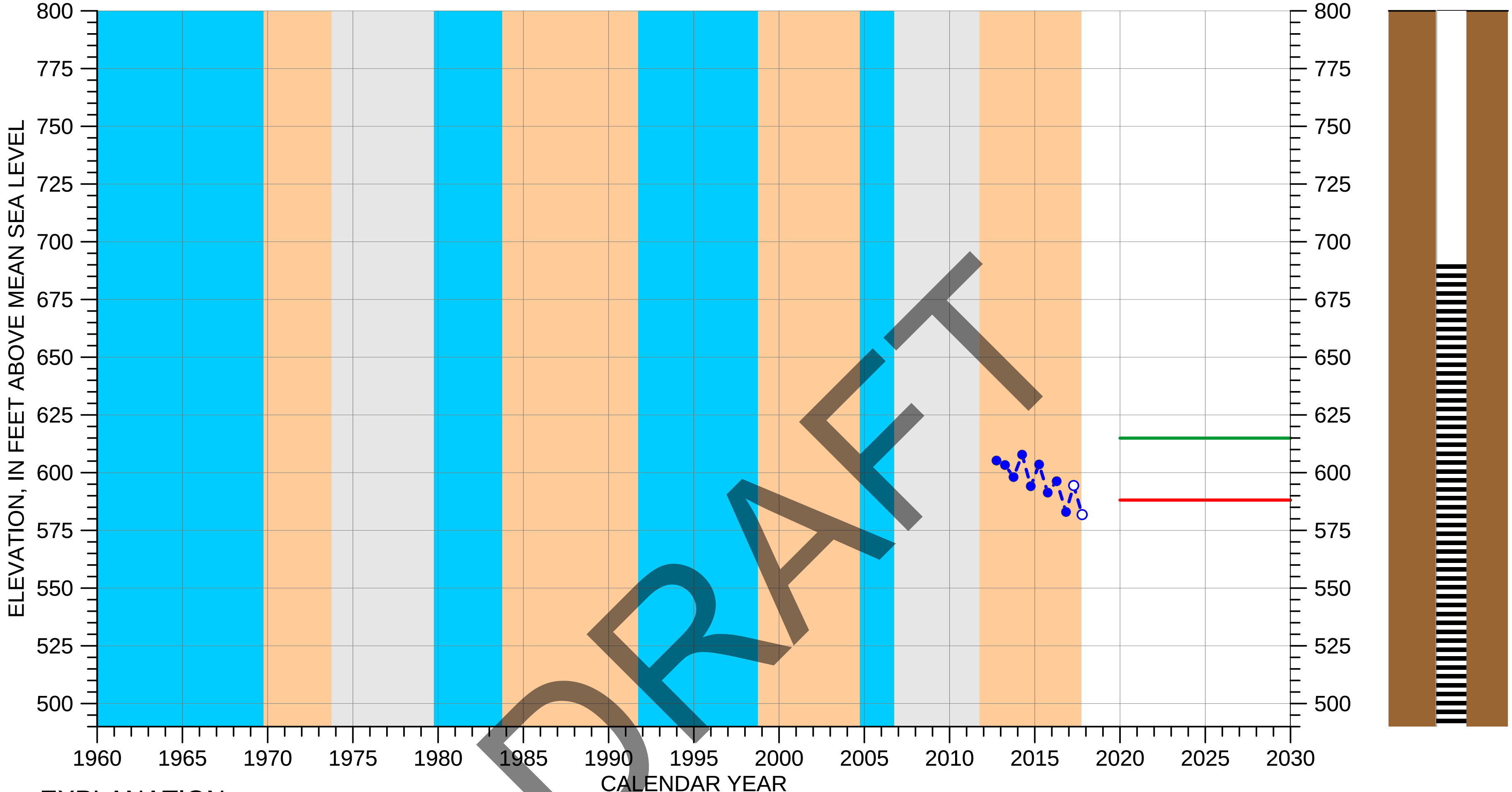
HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 26S/13E-08M01

S:\projects\9200_Paso Robles GSP\SMC\Data\Figures\Hydrographs\grf\AppendixG\Fig06_26S_13E-08M01.grf



EXPLANATION

GROUNDWATER ELEVATION

MEASUREMENT NOT VERIFIED*

MEASURABLE OBJECTIVE

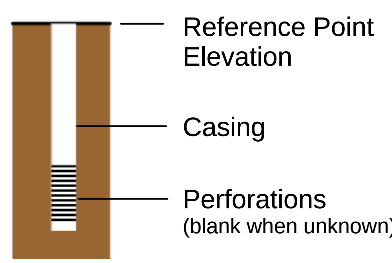
MINIMUM THRESHOLD

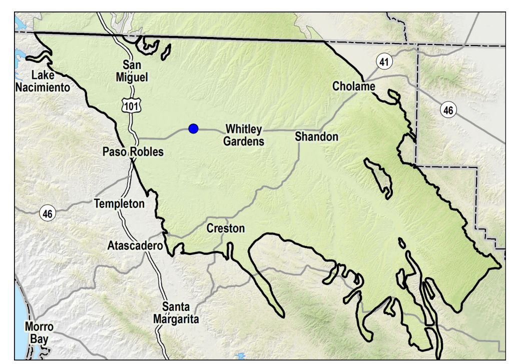
CLIMATE PERIOD CLASSIFICATION

DRY

AVERAGE/ALTERNATING

WET





Well Depth: 400 feet

Screened Interval: 200-400 feet below ground surface

Reference Point Elevation: 890.2 feet above mean sea level

* Measurement reported as not static

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 26S/13E-16N01

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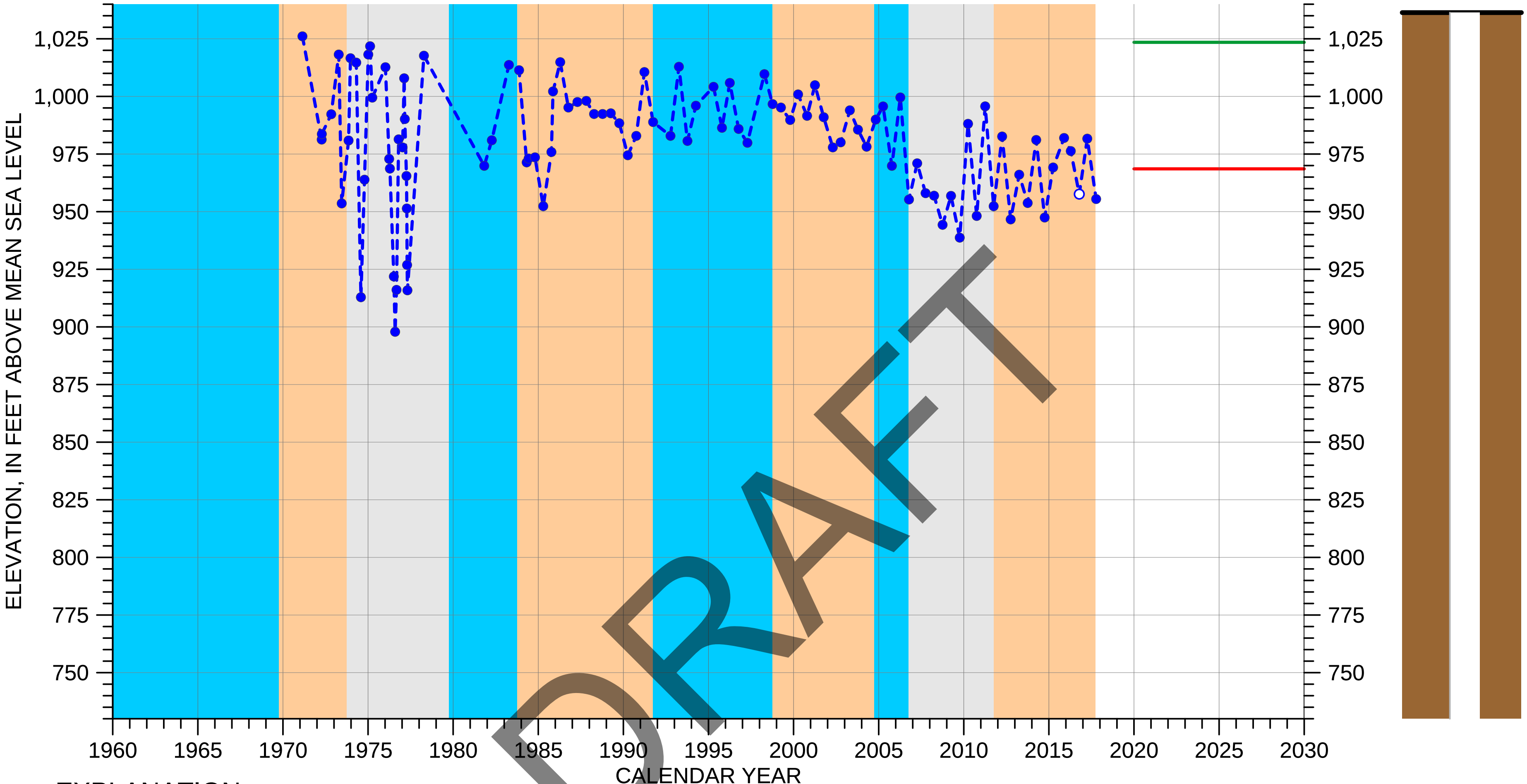
S:\projects\9200_Paso Robles GSP\SMC\Data\Figures\Hydrographs\grf\AppendixG\Fig07_26S_13E-16N01.grf



EXPLANATION

GROUNDWATER ELEVATION

MEASUREMENT NOT VERIFIED*

MEASURABLE OBJECTIVE

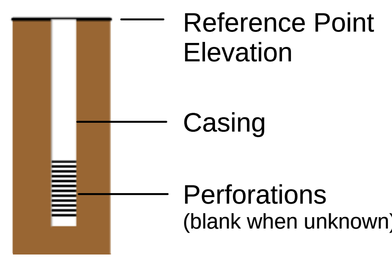
MINIMUM THRESHOLD

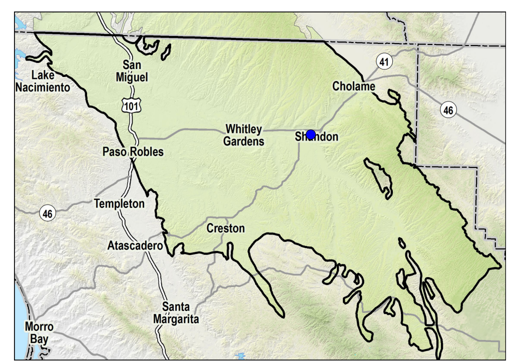
CLIMATE PERIOD CLASSIFICATION

DRY

AVERAGE/ALTERNATING

WET





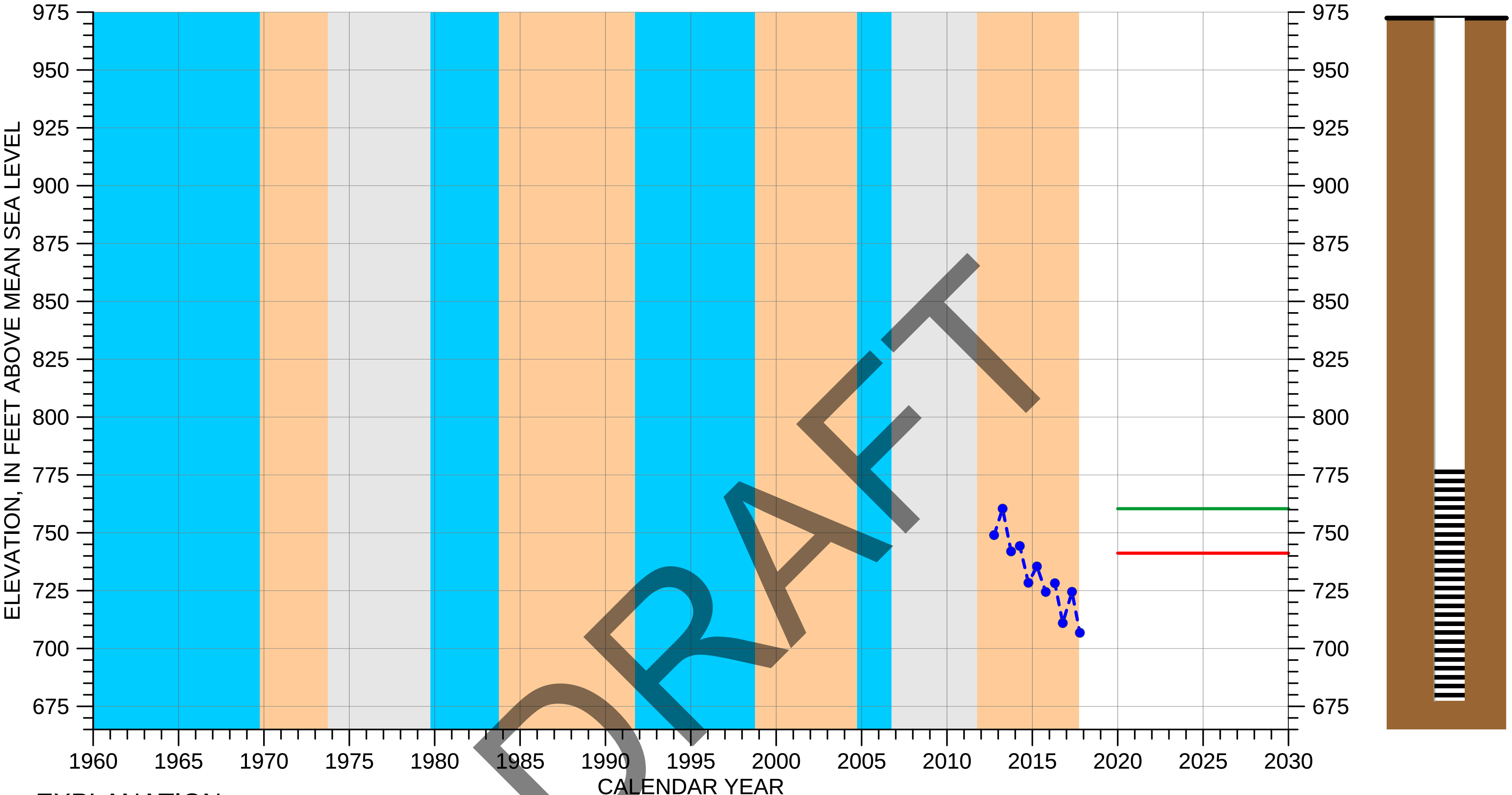
Well Depth: 385 feet
Screened Interval: unknown
Reference Point Elevation: 1036.87 feet above mean sea level

* Measurement reported as not static

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 26S/15E-20B02

MONTGOMERY & ASSOCIATES

S:\projects\9200_Paso Robles GSP\SMC\Data\Figures\Hydrographs\grf\AppendixG\Fig08_26S_15E-20B02.grf



EXPLANATION

GROUNDWATER ELEVATION

MEASUREMENT NOT VERIFIED*

MEASURABLE OBJECTIVE

MINIMUM THRESHOLD

CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET

Reference Point Elevation

Casing

Perforations
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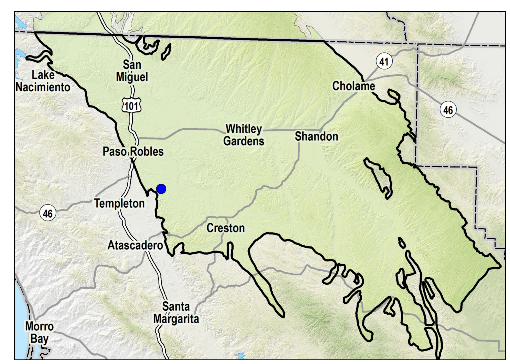

Well Depth: 295 feet
Screened Interval: 195-295 feet below ground surface
Reference Point Elevation: 972.4 feet above mean sea level

* Measurement reported as not static

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 27S/12E-13N01

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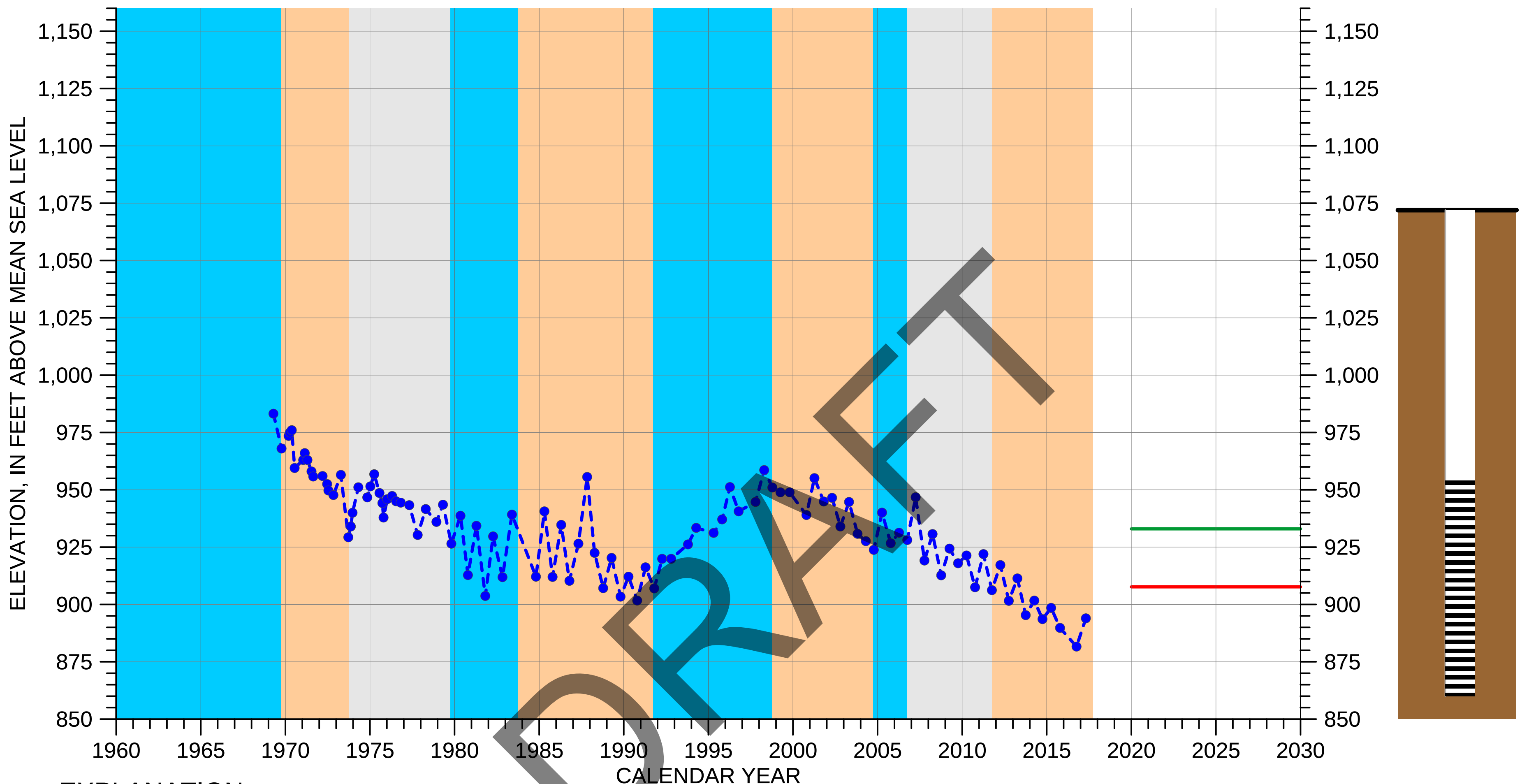
S:\projects\9200_Paso Robles GSP\SMC\Data\Figures\Hydrographs\grf\AppendixG\Fig10_27S_12E-13N01.grf



EXPLANATION

GROUNDWATER ELEVATION

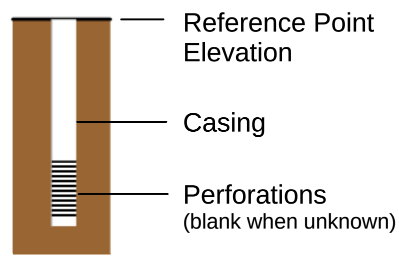
MEASUREMENT NOT VERIFIED*

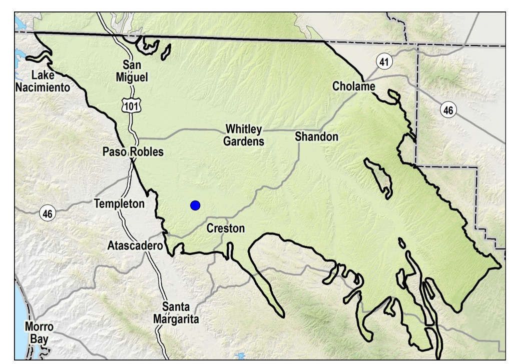
MEASURABLE OBJECTIVE

MINIMUM THRESHOLD

CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET





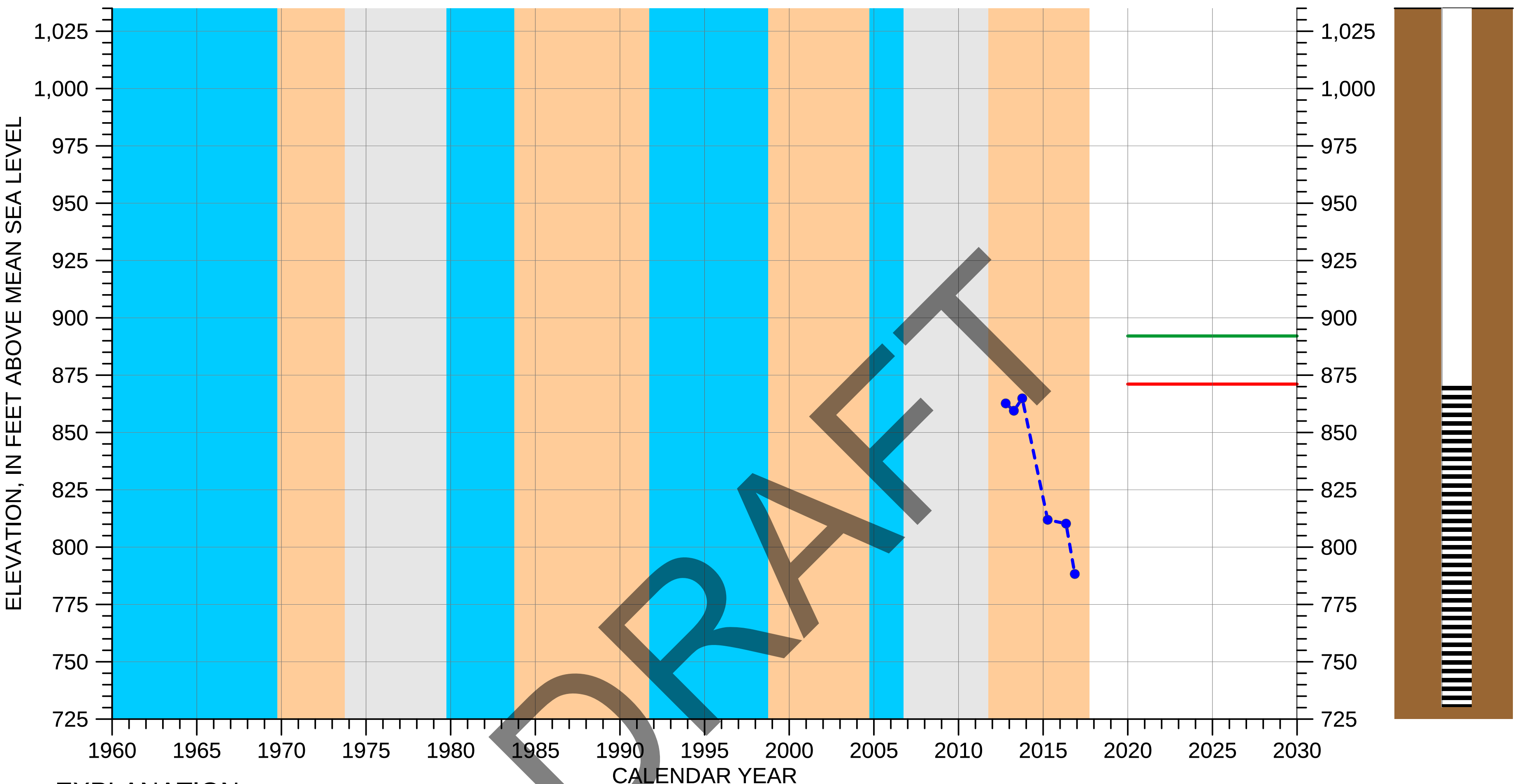
Well Depth: 212 feet
Screened Interval: 118-212 feet below ground surface
Reference Point Elevation: 1072 feet above mean sea level

* Measurement reported as not static

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 27S/13E-28F01

MONTGOMERY & ASSOCIATES

S:\projects\9200_Paso Robles GSP\SMC\Data\Figures\Hydrographs\grf\AppendixG\Fig11_27S_13E-28F01.grf



EXPLANATION

GROUNDWATER ELEVATION

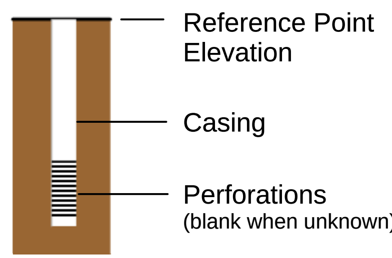
MEASUREMENT NOT VERIFIED*

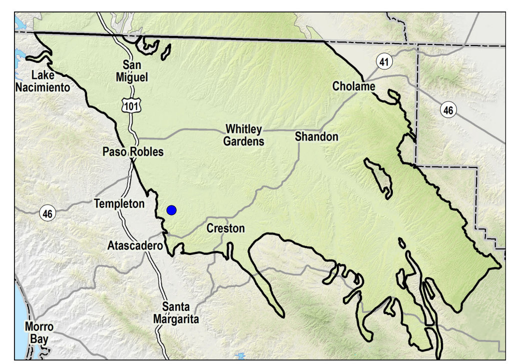
MEASURABLE OBJECTIVE

MINIMUM THRESHOLD

CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET





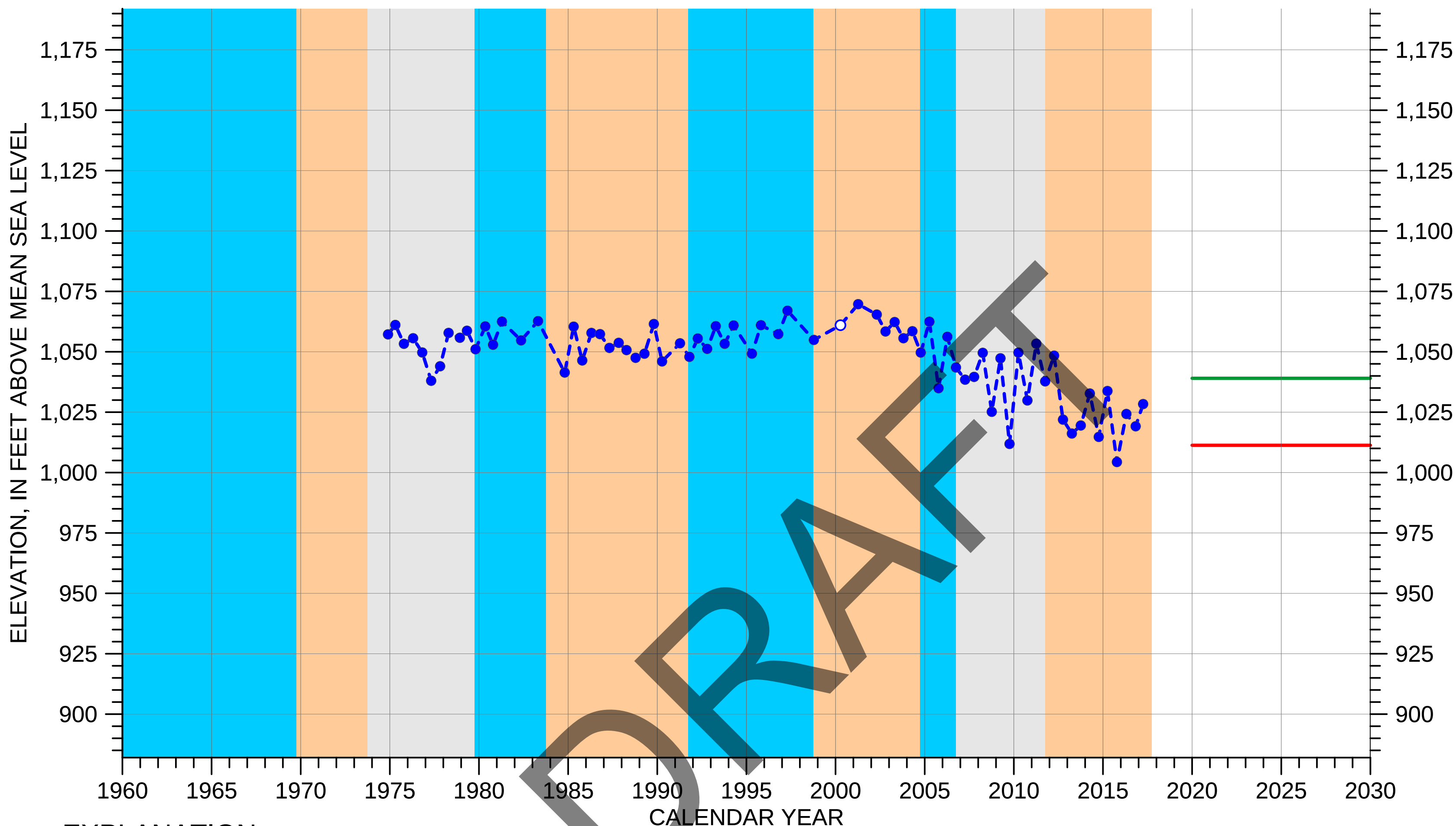
Well Depth: 355 feet
Screened Interval: 215-235, 275-355 feet below ground surface
Reference Point Elevation: 1086.7 feet above mean sea level

* Measurement reported as not static

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 27S/13E-30N01

MONTGOMERY & ASSOCIATES

S:\projects\9200_Paso Robles GSP\SMC\Data\Figures\Hydrographs\grf\AppendixG\Fig12_27S_13E-30N01.grf



EXPLANATION

GROUNDWATER ELEVATION

MEASUREMENT NOT VERIFIED*

MEASURABLE OBJECTIVE

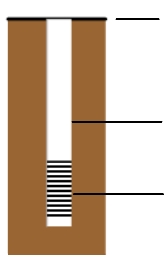
MINIMUM THRESHOLD

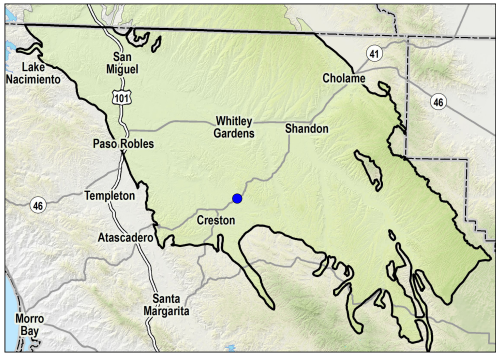
CLIMATE PERIOD CLASSIFICATION

DRY

AVERAGE/ALTERNATING

WET





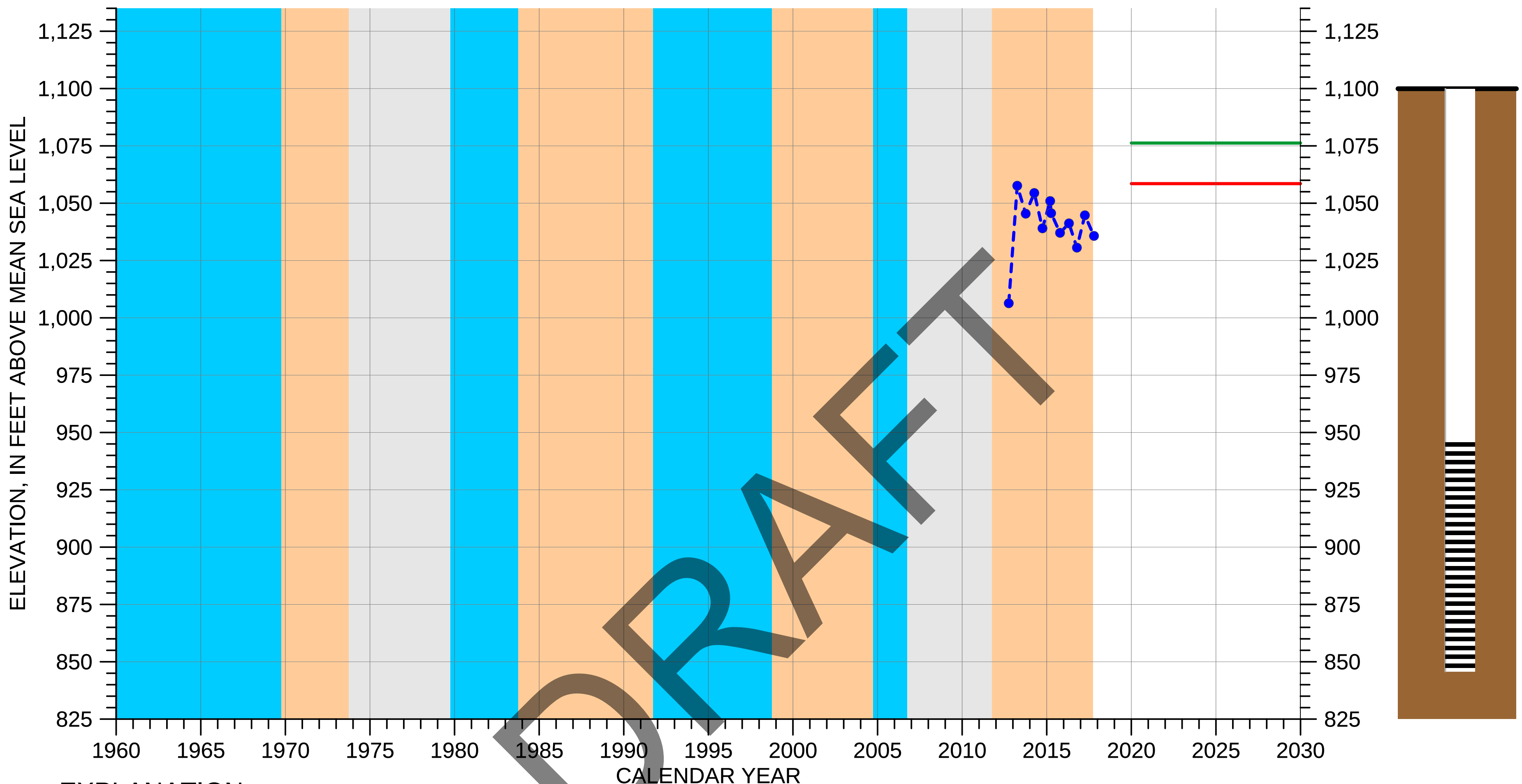
Well Depth: Lower Paso Robles Formation (GSSI, 2016)
Screened Interval: unknown
Reference Point Elevation: 1201.5 feet above mean sea level

* Measurement reported as not static

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 27S/14E-29G01

MONTGOMERY & ASSOCIATES

S:\projects\9200_Paso Robles GSP\SMC\Data\Figures\Hydrographs\grf\AppendixG\Fig13_27S_14E-29G01.grf



EXPLANATION

GROUNDWATER ELEVATION

MEASUREMENT NOT VERIFIED*

MEASURABLE OBJECTIVE

MINIMUM THRESHOLD

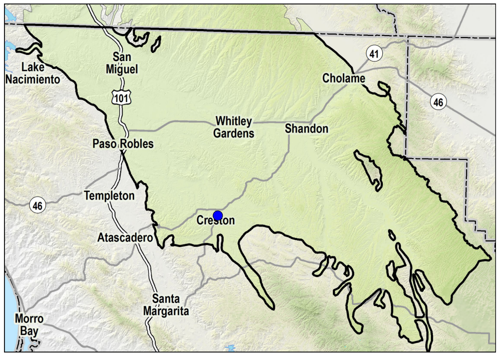
CLIMATE PERIOD CLASSIFICATION

DRY AVERAGE/ALTERNATING WET

Reference Point Elevation

Casing

Perforations
(blank when unknown)



Well Depth: 254 feet
Screened Interval: 154-254 feet below ground surface
Reference Point Elevation: 1099.9 feet above mean sea level

* Measurement reported as not static

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 28S/13E-01B01

MONTGOMERY & ASSOCIATES

S:\projects\9200_Paso Robles GSP\SMC\Data\Figures\Hydrographs\grf\AppendixG\Fig14_28S_13E-01B01.grf