PASO ROBLES SUBBASIN GSP DEVELOPMENT

Project Status Update




Paso Robles Basin GSAs

City of Paso Robles

County of San Luis Obispo

Heritage Ranch CSD

San Miguel CSD

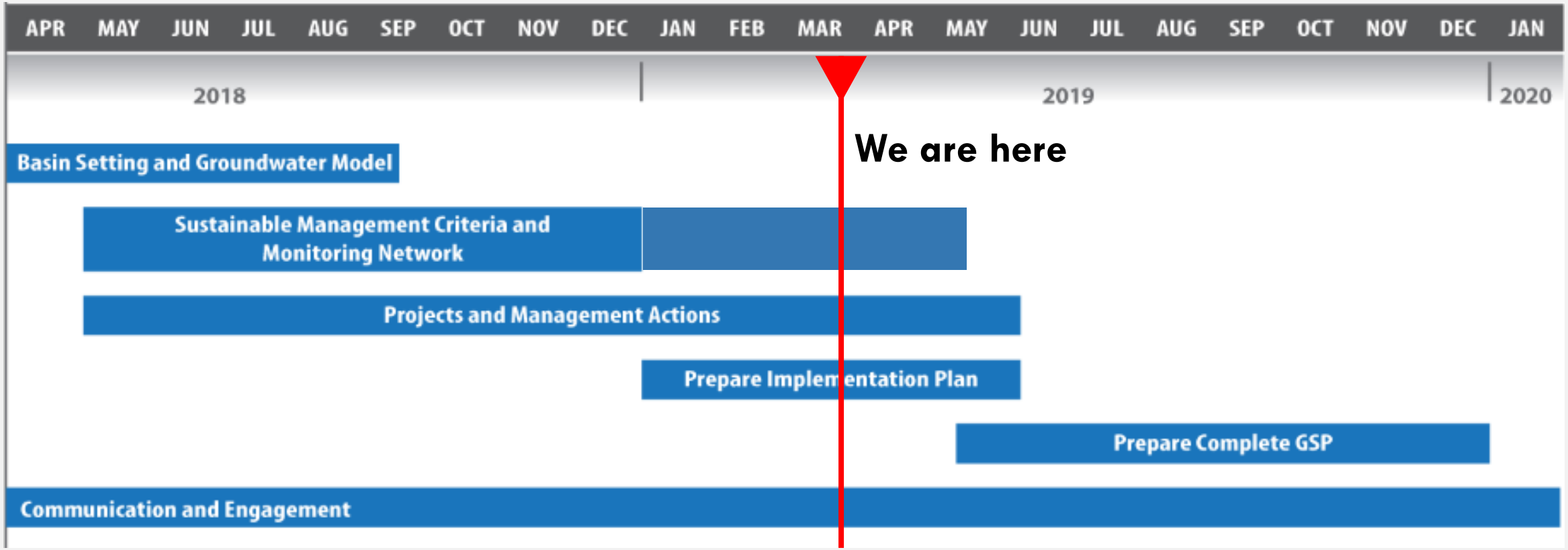
Shandon-San Juan Water District

March 6, 2019

Presentation Outline

- GSP Schedule and Chapter Delivery
- Water Budgets (Chapter 6)
- Monitoring Networks (Chapter 7)
- Sustainable Management Criteria (Chapter 8)
- Appendices A through E, and G

GSP Schedule



GSP Chapters

CHAPTER 1.	Introduction to Paso Robles Subbasin GSP	Receive/Recommend 7/25/18
CHAPTER 2.	Agency Information	Receive/Recommend 7/25/18
CHAPTER 3.	Description of Plan Area	Receive/Recommend 7/25/18
CHAPTER 4.	Hydrogeologic Conceptual Model	Receive/Recommend 9/12/18
CHAPTER 5.	Groundwater Conditions	Receive/Recommend 10/17/18
CHAPTER 6.	Water Budgets	Receive/Recommend 3/6/19
CHAPTER 7.	Monitoring Networks	Receive/Recommend 3/6/19
CHAPTER 8.	Sustainable Management Criteria	Receive/Recommend 3/6/19
CHAPTER 9.	Projects and Management Actions	
CHAPTER 10.	Plan Implementation	
CHAPTER 11.	Notice and Communications	
Appendix F	Communications and Engagement Plan	Receive/Recommend 7/25/18
CHAPTER 12.	Interagency Agreements	

Chapter 6 - Water Budgets & App D

Update to presentation at September 12, 2018 CC meeting

SGMA Reg §354.18 & Best Management Practices document

Outline

- Present GSP groundwater budgets
- Compare GSP groundwater budgets to previous groundwater budgets

Water Budgets

- Surface and groundwater budgets (by regulation)
- Focus of presentation on groundwater budgets
- Three water budgets for GSP:
  1. Historical (1981-2011)
  2. Current (2012-2016)
  3. Future (2020-2070)
- Water budgets include:
  - Inventory all inflows (supply) and outflows (demand)
  - Estimate groundwater storage deficit
  - Estimate sustainable yield

Summary of GSP Groundwater Budgets

- Key terms
  - **Groundwater Storage Deficit** (long-term GW outflow > GW inflow)
  - **Sustainable Yield** (total pumping minus storage deficit)

- Estimated groundwater budgets – different than previous studies:

Groundwater Budget	Groundwater Storage Deficit	Sustainable Yield
Historical (1981 – 2011)	12,500 AFY	59,900 AFY
Current (2012 – 2016)	65,400 AFY	20,400 AFY
Future (2020 – 2040)	13,700 AFY	61,100 AFY

- Future groundwater budget used for developing projects & management actions

Changes in Groundwater Budget (Appendix D)

1. Modifications to Model

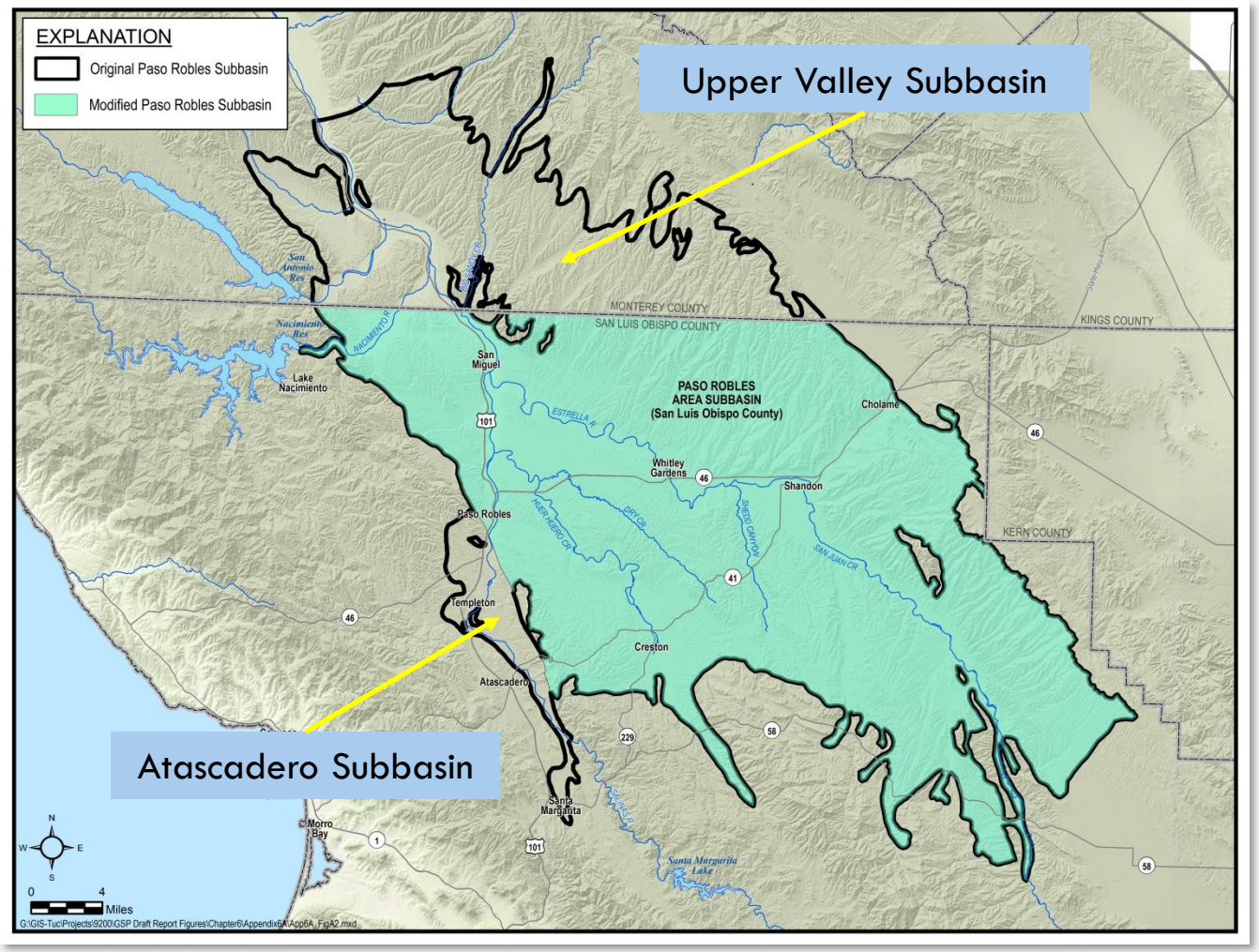
20% of water budget change

2. Change in Subbasin Area

80% of water budget change

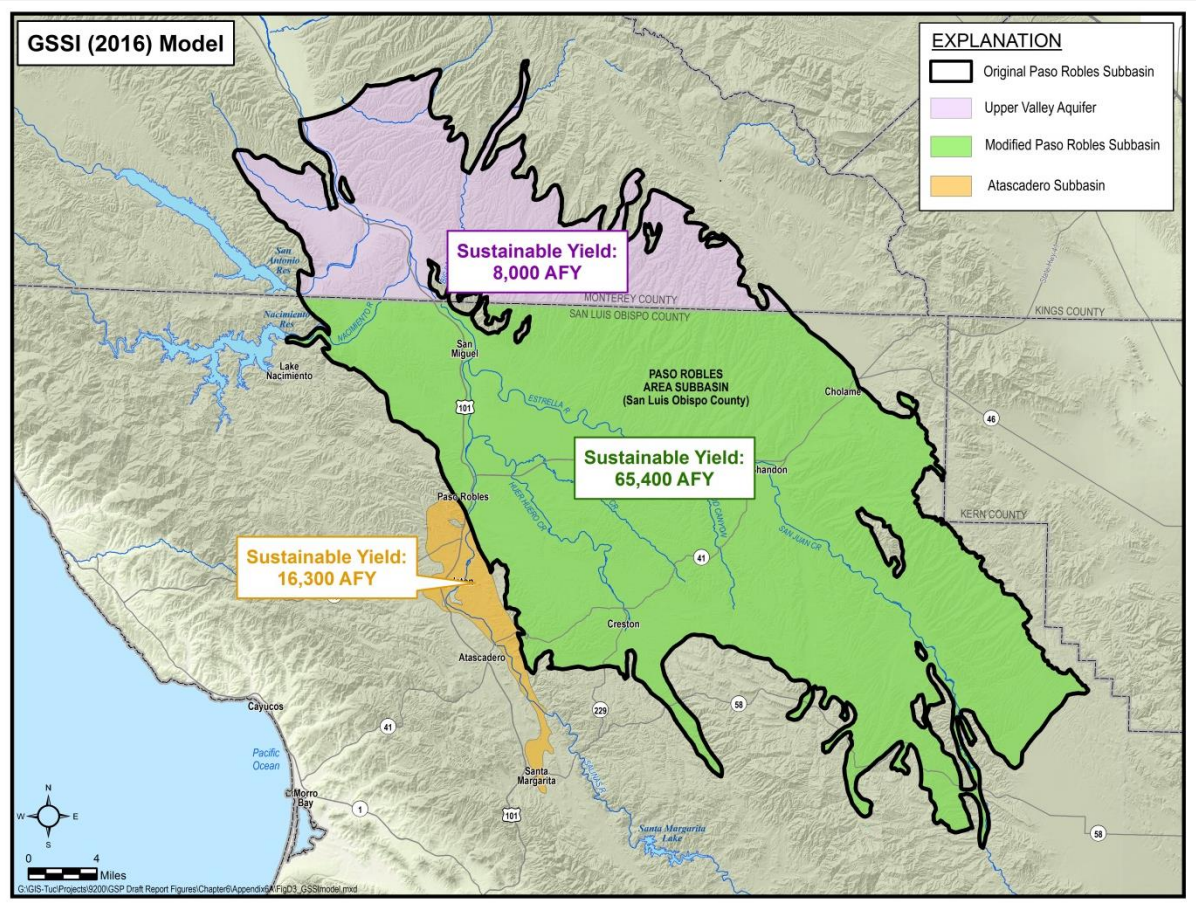
Changes in Subbasin Boundary

- Previous groundwater budgets:
  - Entire Paso Robles Subbasin (outlined by black line)
  - Included Atascadero Subbasin & Upper Valley Subbasin
- GSP groundwater budgets:
  - Newly Defined Paso Subbasin by DWR (in green)

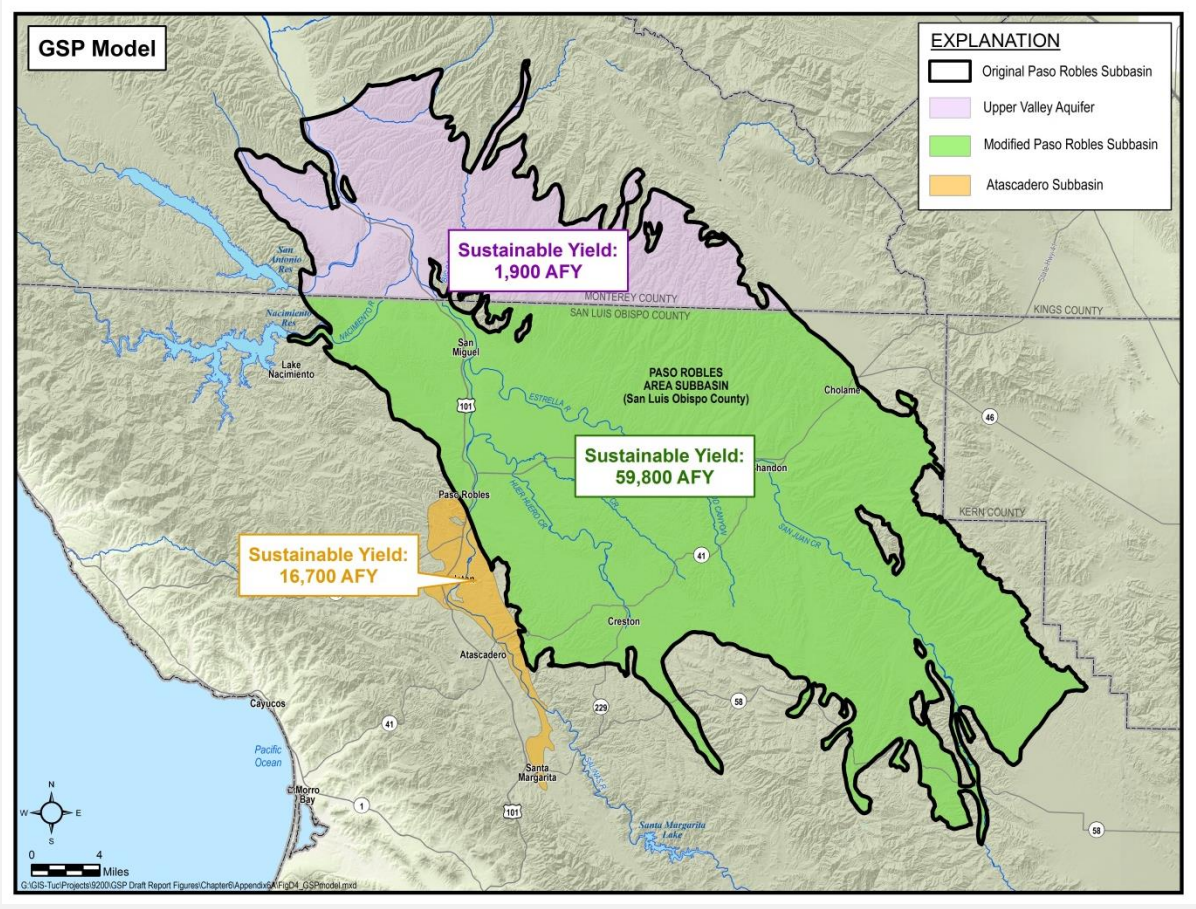


Historical Sustainable Yield by Area

Original 2016 GSSI Model



Update GSP Model



Previous and Current GSP Groundwater Budgets

Previously Reported		GSP	
GW Storage Deficit	Sustainable Yield	GW Storage Deficit	Sustainable Yield
3,000 – 3,500 AFY	**~ 90,000 AFY**	**12,500 AFY**	**~ 60,000 AFY**
Original GSSI model and original Subbasin		Update GSP model and new Subbasin	

Questions about Water Budgets

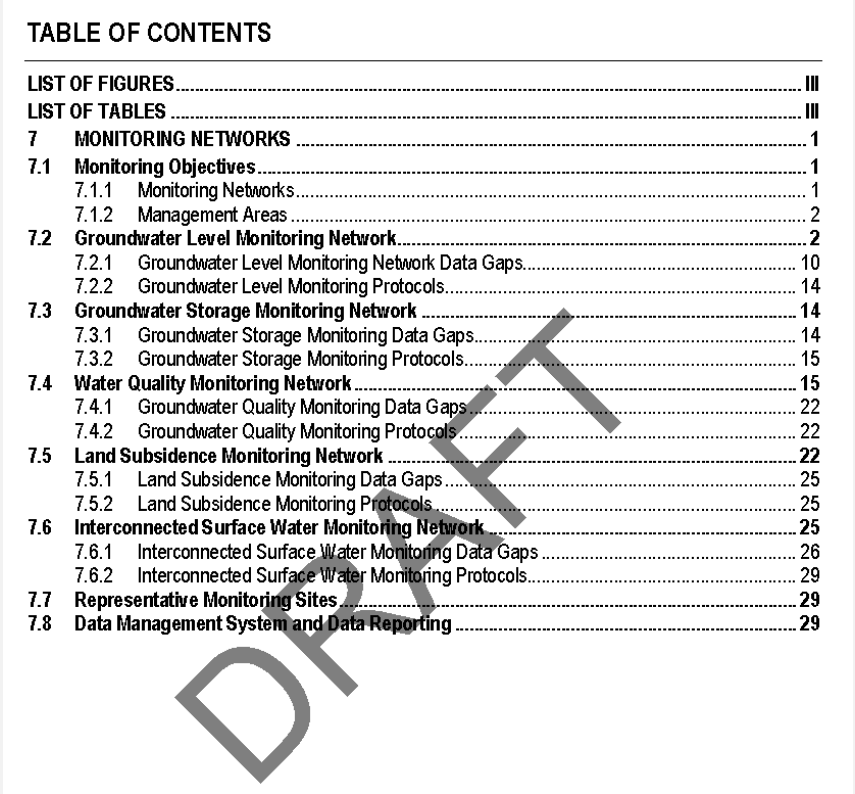
Chapter 7 – Monitoring Networks

SGMA Reg §354.32 – 40

Best Management Practices document

Chapter Content

- Monitoring Networks
- Representative Monitoring Sites
- Data Management System



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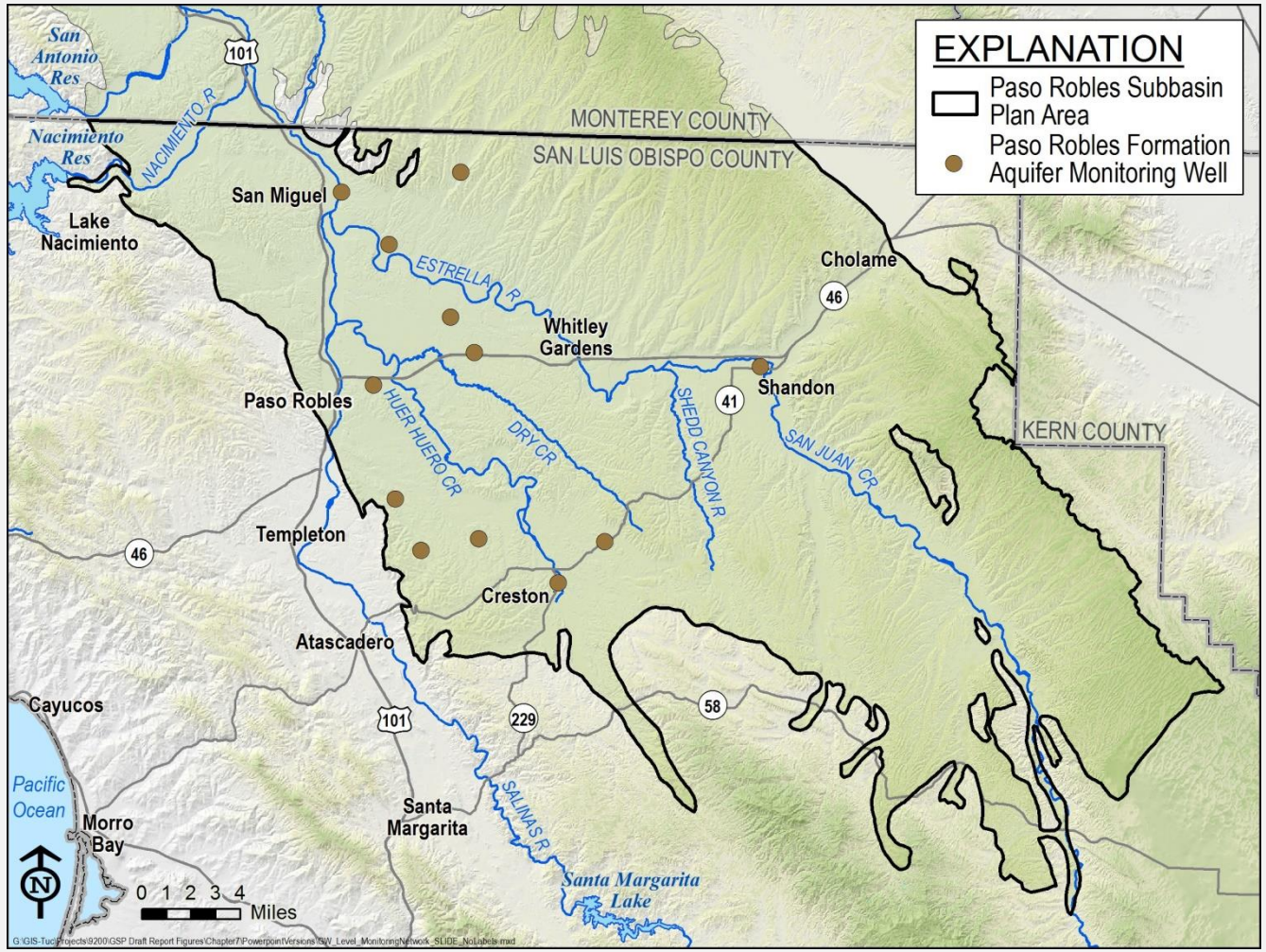
Monitoring Networks

- One for each applicable sustainability indicator in Subbasin

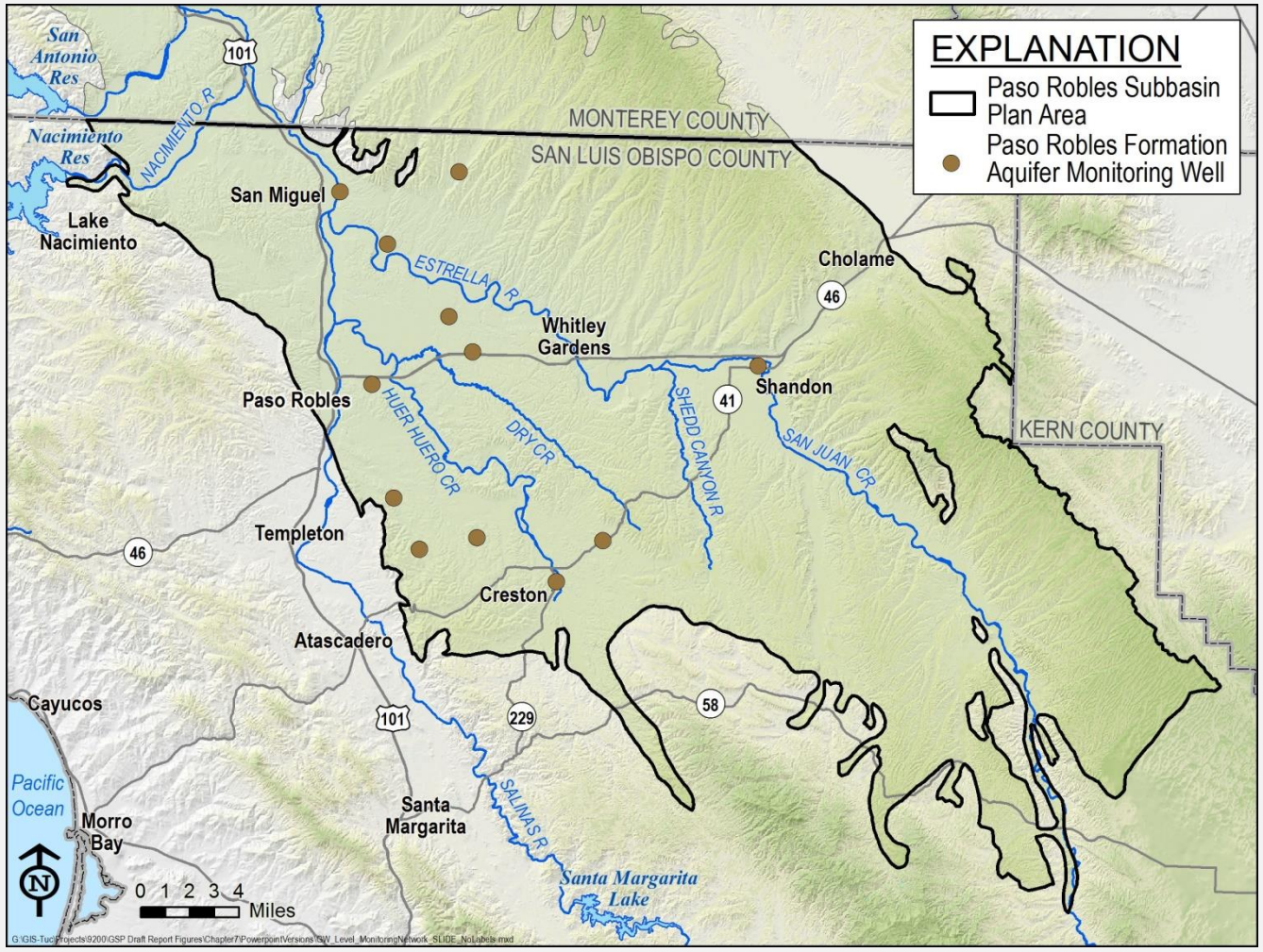
Chronic Lowering of Groundwater Levels

- Requires well construction details and non-confidential
- Limited to 12 monitoring wells (all screened in Paso Robles Fm Aquifer)
- Data gaps
  - Limited by confidentiality agreements
  - Wells needed in both aquifers and more areas



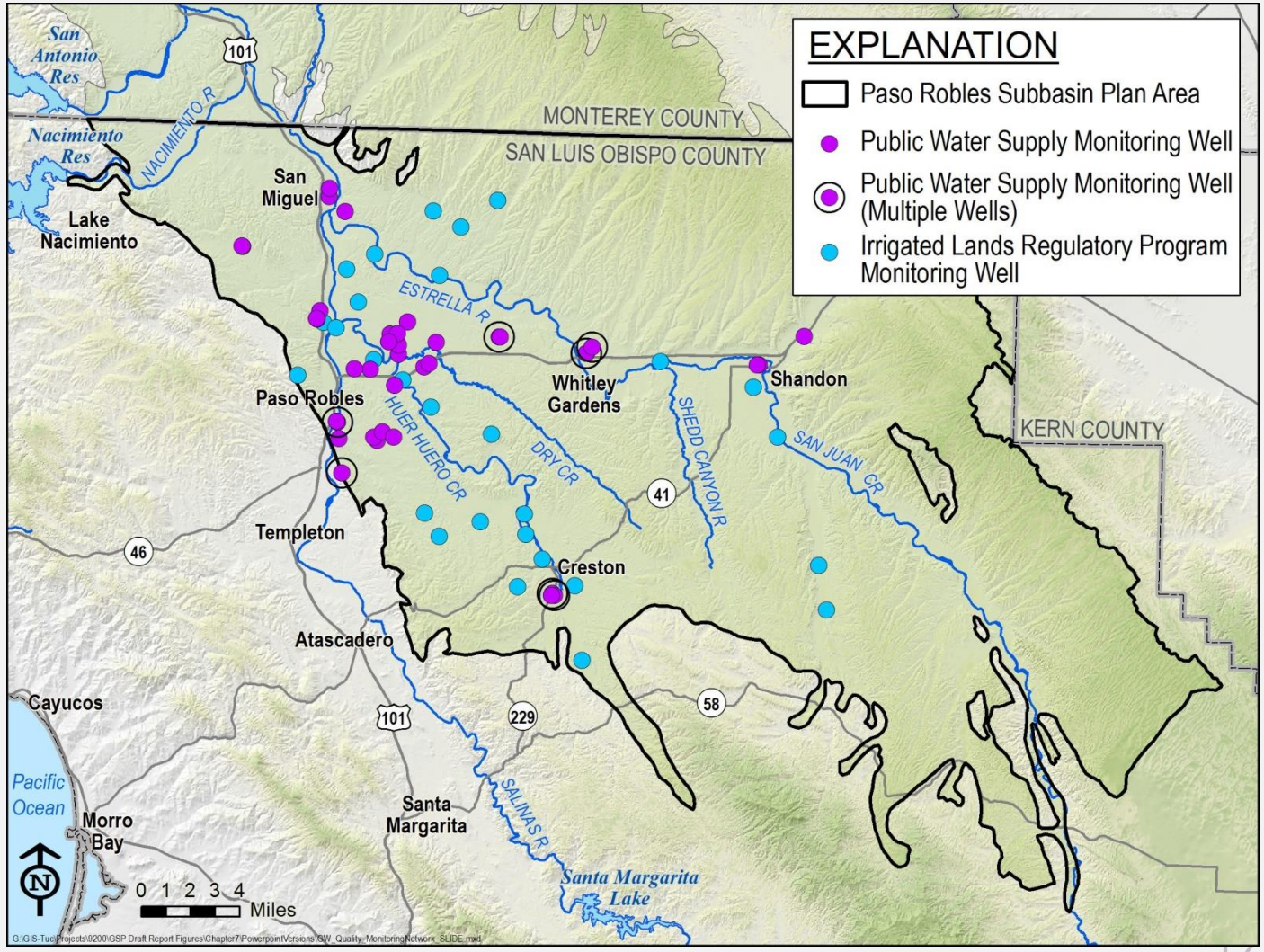
Depletion of Groundwater Storage

- Use groundwater levels as a proxy for change in storage
- Same as groundwater level monitoring network
- Data gaps
  - Need more wells
  - Expand in future



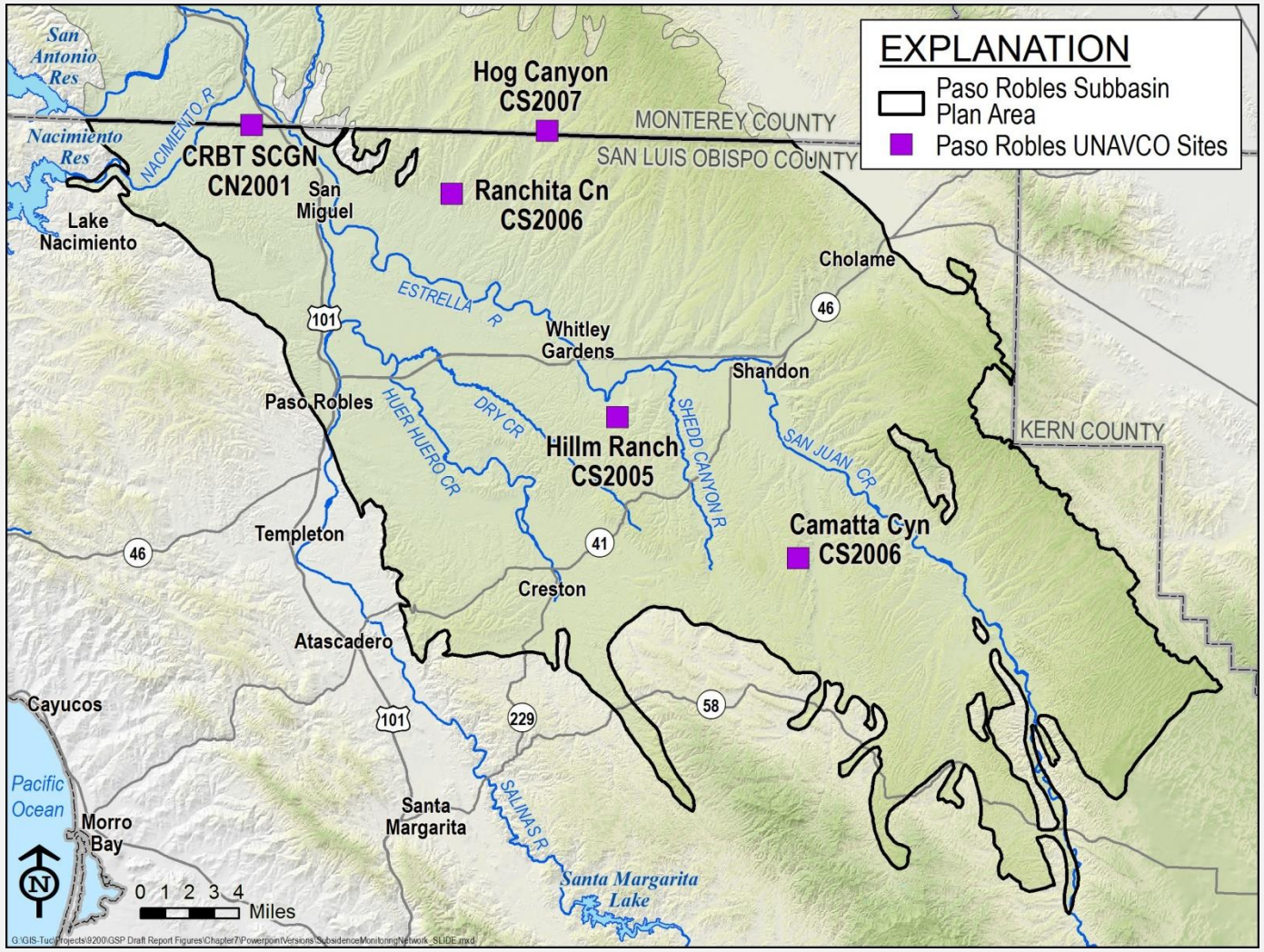
Water Quality

- Public Supply Wells
  - Wells from State Water Board, Drinking Water Division
  - Drinking water constituents of concern (identified in Chapter 3)
  - 41 wells (31 in PR, 7 in AA, 3 unknown)
- Ag Wells
  - Wells from Irrigated Lands Regulatory Program (ILRP)
  - Irrigation water constituents of concern (identified in Chapter 3)
  - 28 properties with wells that will be monitored (can have several wells on one parcel)
- No significant data gaps



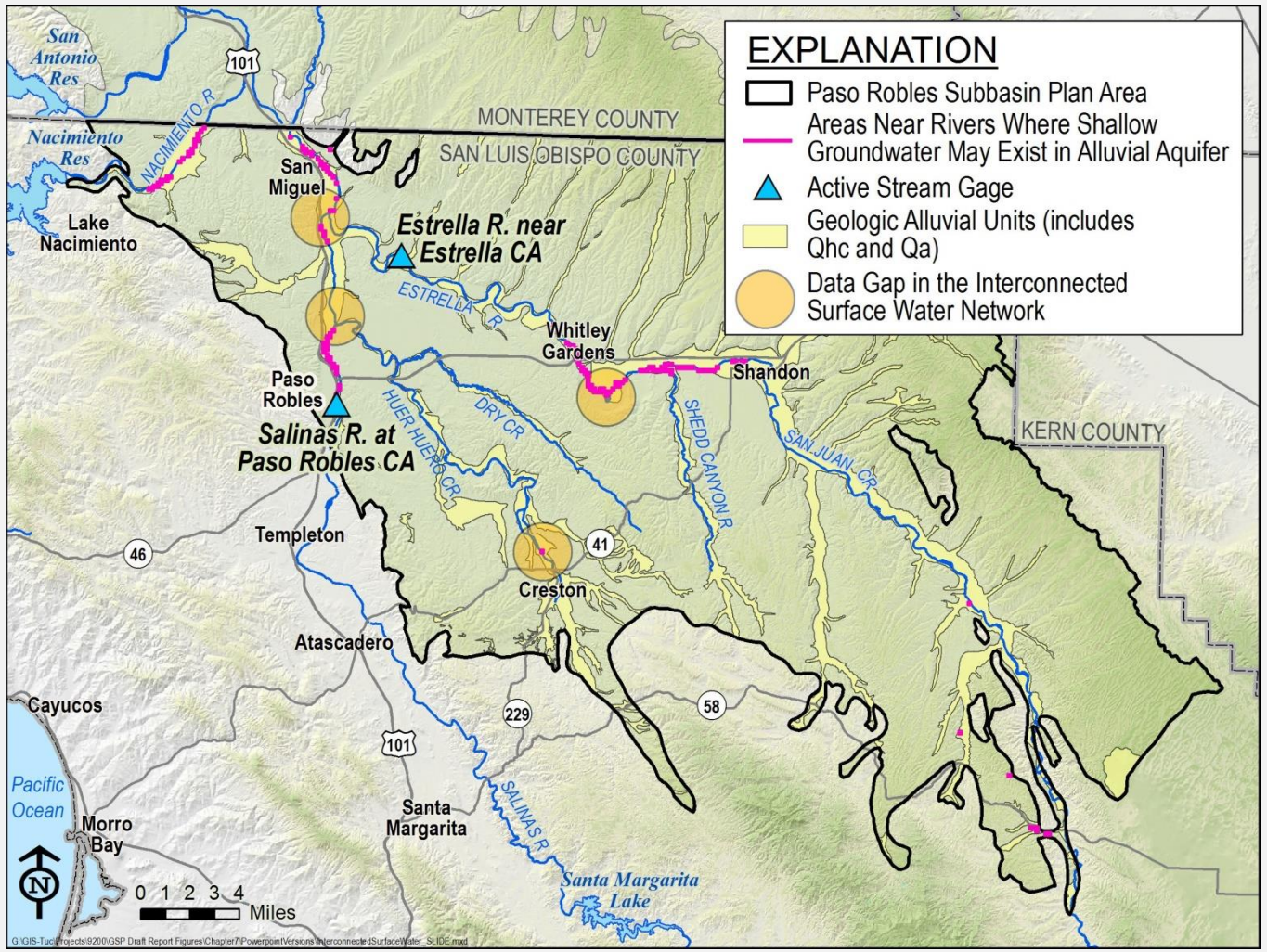
Land Subsidence

- Monitor land surface elevation
- 5 continuous global positioning system sites
- No significant data gaps



Interconnected Surface Water and Groundwater

- Interconnected SW & GW does not exist currently
- Conduct study in future to investigate interconnection
- Maps show areas where shallow groundwater in Alluvial Aquifer may exist based on model simulation



Data Management System (DMS)

- Required by regulations

- Paso Robles Subbasin DMS
  - Microsoft Access database
  - Includes well information, groundwater level data, and groundwater quality data currently
  - Limited to publicly available data
  - Expand in future & integrate with County DMS

Questions about Monitoring Networks

Chapter 8 – Sustainable Management Criteria

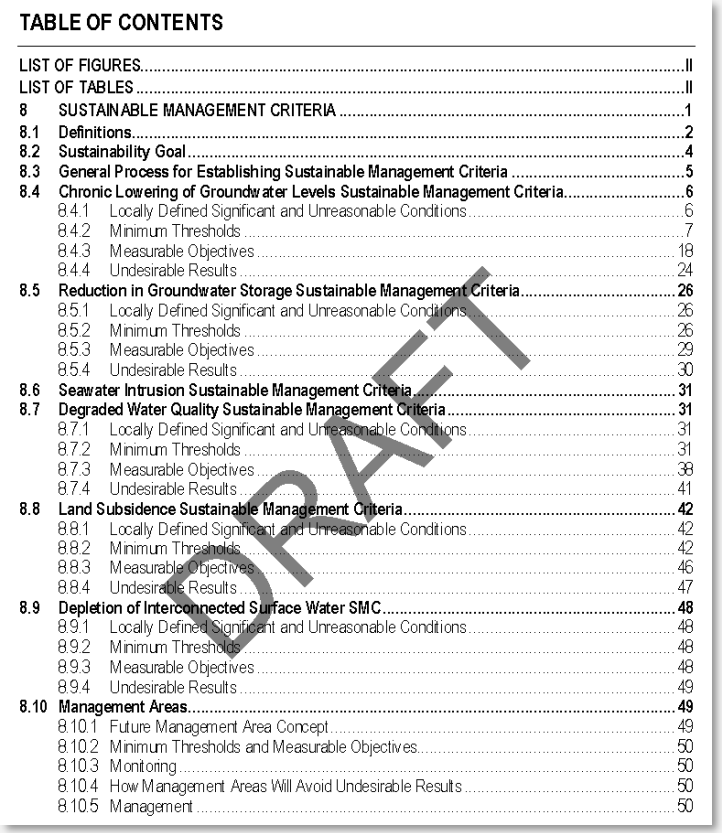
SGMA Reg §354.22 – 30

Heavily Regulatory Driven Chapter

Draft Best Management Practice document

Outline

- Overview of process
- Review SMC for each sustainability ind
- Management area concept



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Overview of Sustainable Management Criteria

- Define future sustainable conditions
- Quantitative metrics monitored by networks (Chapter 7)
- Develop for each applicable sustainability indicator

- Include:
  - Locally defined significant & unreasonable conditions
  - Minimum thresholds
  - Measurable objectives
  - Undesirable results

Sustainability Goal for Subbasin

Three parts:

- *Commitment*
- *What measures we are implementing to get to sustainability*
- *How these measures will likely achieve sustainability*

Sustainability Goal for Subbasin

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. – *Chapter 8, Sustainable Management Criteria, Draft GSP*

Basis for Sustainable Management Criteria

- Available data and Subbasin hydrogeologic conditions
- Survey results and public preferences
- Public outreach meetings
- Input and guidance from GSAs
- **Current Sustainable Management Criteria are initial values and will likely change in future based on new data**

Definition of Key Terms

Key Term	Definition	Example
Minimum Threshold	Quantitative indicator of unreasonable conditions	Low groundwater level in a well
Measurable Objective	Quantitative goal that GSPs are designed to achieve	Future groundwater level in a well that sustains access to groundwater for all uses
Undesirable Results	Quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin."	15% of groundwater elevations fall below minimum thresholds in any year

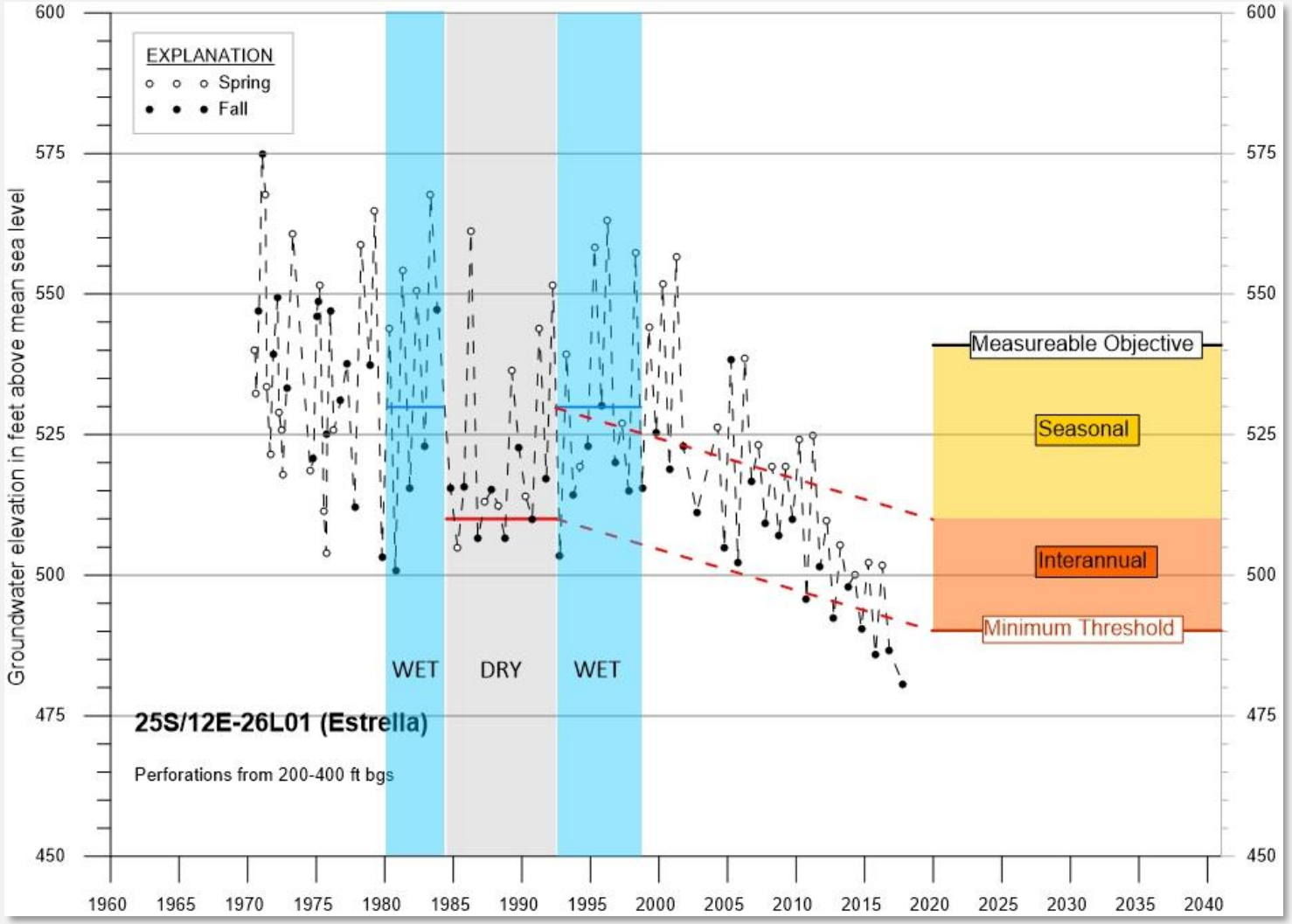
SMC 1: Chronic Lowering of Groundwater Levels

- Important Sustainable Management Criteria; related to most other Sustainable Management Criteria

- Stakeholder Preferences
  - Generally, current water levels preferred in Estrella and Shandon area
  - Generally, water level similar to 10 years ago preferred by rural residential

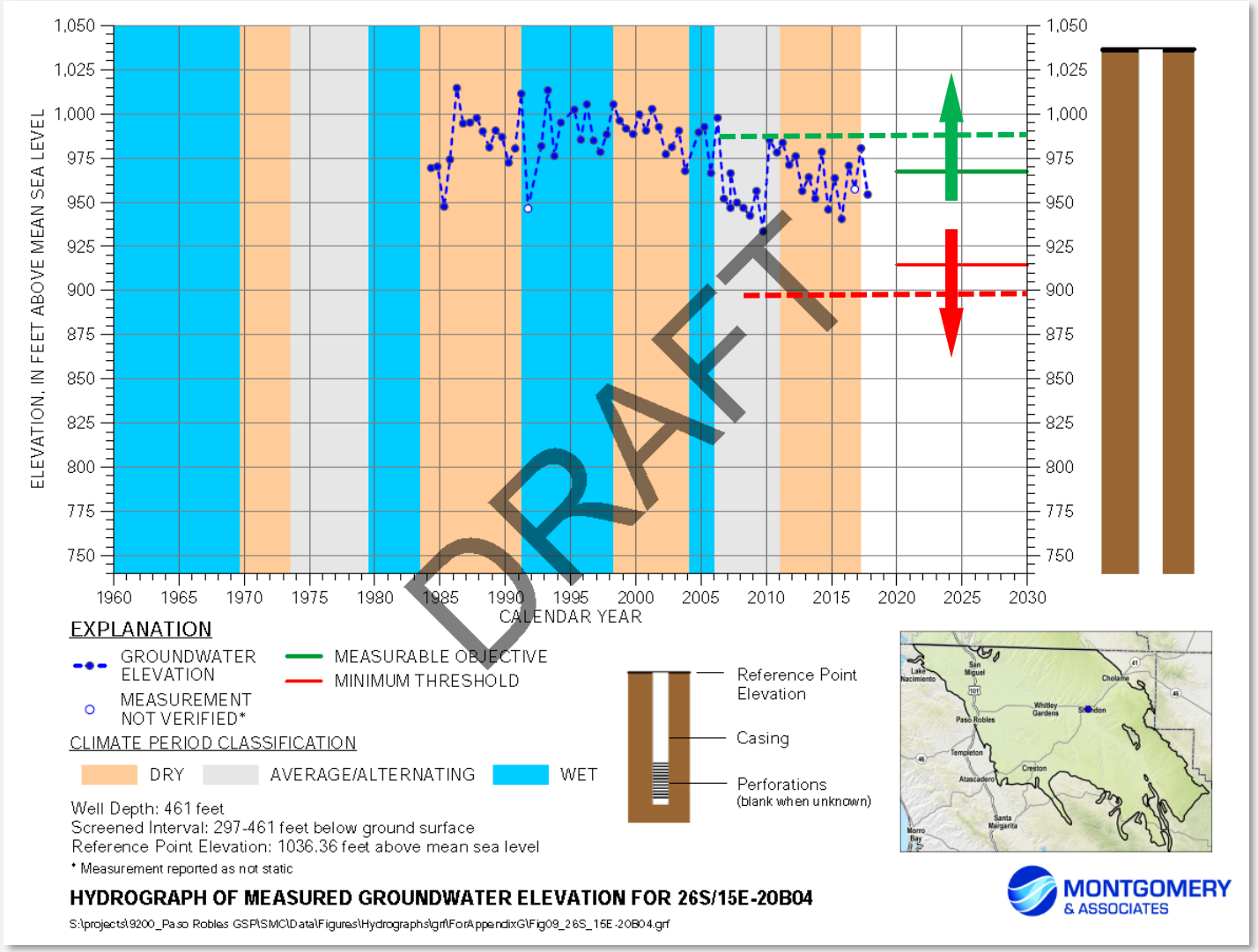
- Established for each aquifer
  - Alluvial Aquifer – no monitoring wells; based on model simulation
  - Paso Robles Formation Aquifer – available data and public preferences

Minimum Thresholds & Measurable Objectives Values
Paso Robles Formation Aquifer
Chronic Lowering of Groundwater Levels



Monitoring Site	Minimum Threshold (feet NAVD88)	Measurable Objective (feet NAVD88)
25S/12E-16K05	537.0	574.4
25S/12E-26L01	490.2	540.9
25S/13E-08L02	915.6	929.4
26S/12E-26E07	648.5	692.3
26S/13E-08M01	612.8	643.6
26S/13E-16N01	588.1	615.0
26S/15E-20B02	968.6	1023.5
27S/12E-13N01	741.2	760.4
27S/13E-28F01	907.7	933.0
27S/13E-30N01	871.1	892.1
27S/14E-29G01	1011.3	1039.0
28S/13E-01B01	1058.5	1076.2

Implication of Minimum Thresholds & Measurable Objectives
Paso Robles Formation Aquifer
Chronic Lowering of Groundwater Levels



- Raise Measurable Objective
  - More pumping cutbacks
  - More imported water
- Lower Minimum Threshold
  - More storage loss
  - Shallow wells may go dry

Undesirable Results

Chronic Lowering of Groundwater Levels

- In any year, no more than 15% of the groundwater elevation minimum thresholds shall be exceeded in any single aquifer
  - For current monitoring network, no more than 2 wells can exceed minimum thresholds

- Causes of Undesirable Results
  - Localized increase in pumping
  - Adding *de minimis* pumping
  - Drought

SMC 2: Reduction in Groundwater Storage

- Significant and Unreasonable Conditions
  - Actions that lead to long-term reduction in groundwater in storage
  - Interfere with other Sustainable Management Criteria

- Stakeholder preferences
  - More groundwater in storage
  - New pumping be offset by new recharge
  - Reduced pumping in dry years (but not reduced pumping in all years)

- Single value for entire Subbasin, not for each aquifer

Minimum Thresholds & Measurable Objectives

Reduction in Groundwater Storage

- SGMA Regulations define minimum threshold as:

*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.*

- Groundwater elevation data used as a proxy (§ 354.36(b)(1))
- Monitoring network same as groundwater elevation network
- Report average groundwater level annually at RMSs
- Measurable objective same as minimum threshold

Undesirable Results

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

- Potential Causes of Undesirable Results
  - Increased pumping
  - Drought

SMC 3: Degraded Water Quality

- Significant and Unreasonable Conditions **CAUSED BY GSA ACTIONS**
  - Municipal supply wells
    - Compound of concern (COCs) concentrations above regulatory standards like federal maximum contaminant level (MCL)
  - Agricultural supply wells
    - COC concentrations unacceptable for crop production
  - Compounds of concern

Municipal Supply Wells	Agricultural Supply Wells
Total dissolved solids, chloride, sulfate, nitrate, gross alpha radiation	Chloride and boron

    - COCs must have regulatory standard (muni) or concentration threshold (ag)
    - COCs must be detected above regulatory standard or threshold

Minimum Thresholds & Measurable Objectives

Degraded Water Quality

- By SGMA regulations:

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

- GSP uses number of supply well criterion

- Basis for setting minimum thresholds is *no **additional** exceedances above regulatory standard or ag water thresholds* (Table 8-3 of GSP)

- Measurable objectives same as minimum thresholds

Minimum Thresholds & Measurable Objectives

Degraded Water Quality

Paso Robles Formation Aquifer

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%

Alluvial Aquifer

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%

Undesirable Results

Degraded Water Quality

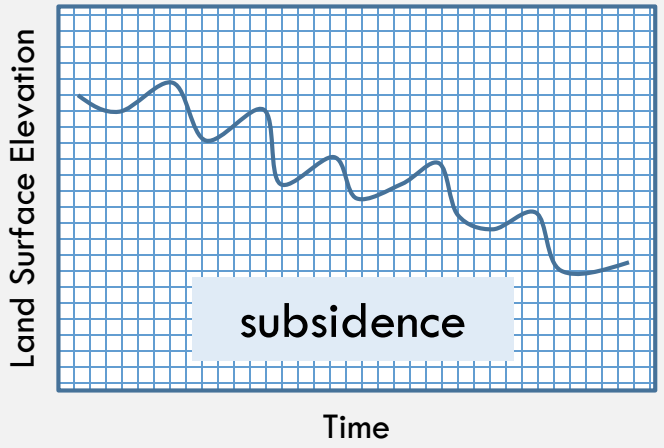
- Undesirable Result is:

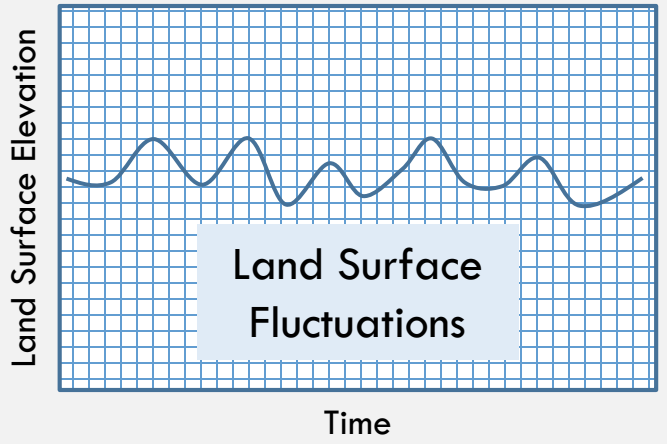
On average during any one year, no groundwater quality minimum threshold shall be exceeded in any aquifer ***as a direct result of projects or management actions taken as part of GSP implementation.***

- Potential Causes of Undesirable Results
  - Changes in pumping distribution
  - Recharge of poor-quality water

SMC4: Land Subsidence

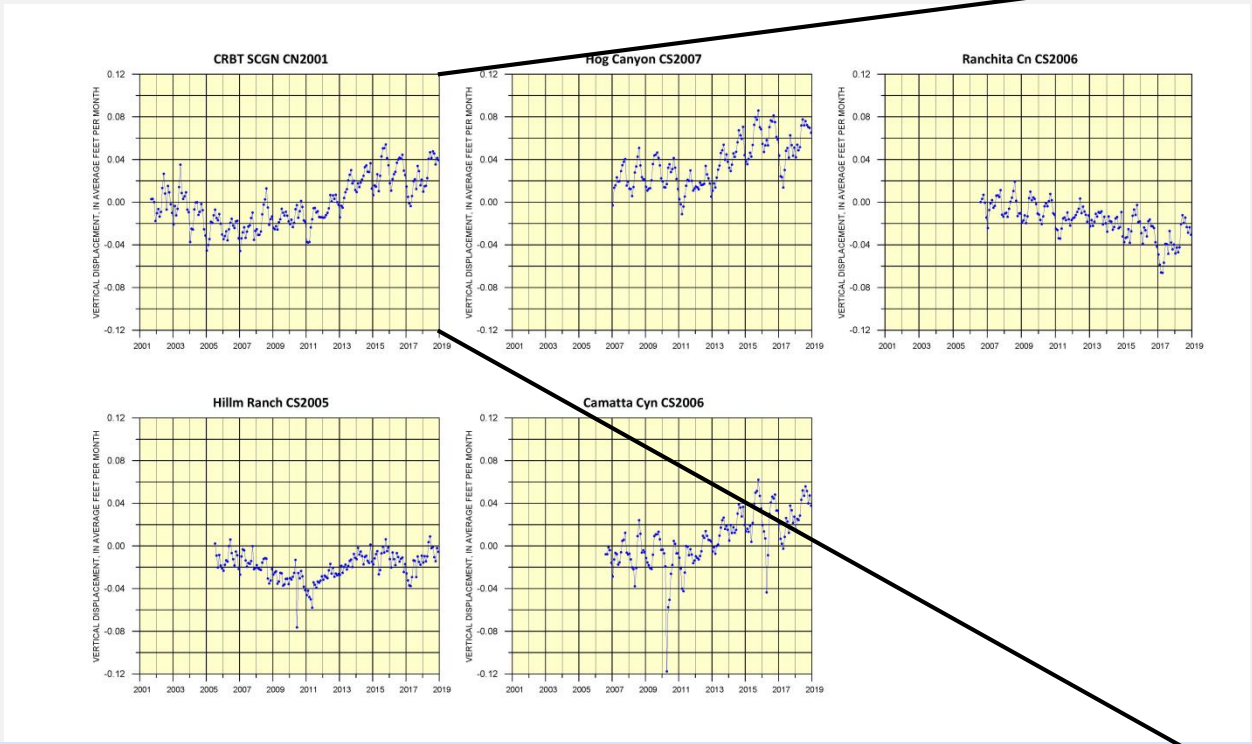
- Significant and Unreasonable Condition is a *permanent decline in land surface elevation that causes harm to infrastructure*
- Land subsidence is different than land surface fluctuations





- Available data do not indicate evidence of subsidence in Subbasin

Land Surface Elevation Monitoring Data



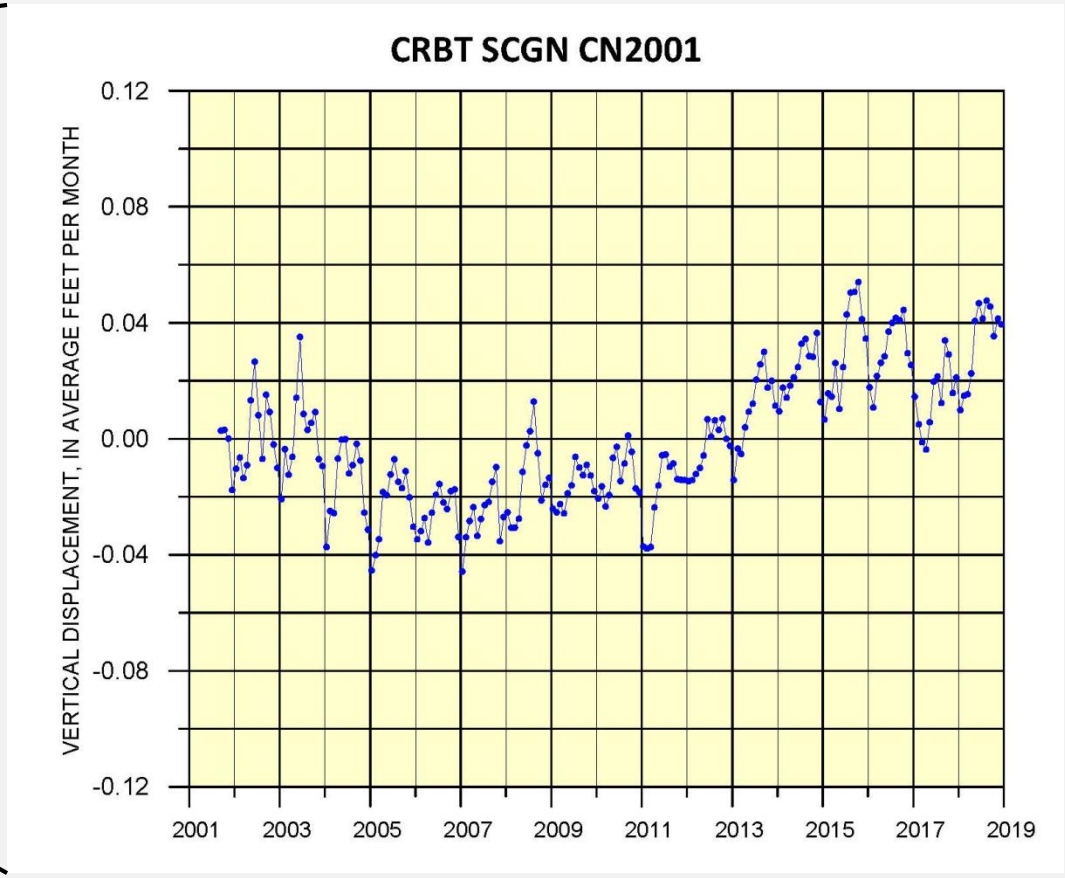


Figure 7-6. Monthly Averages of Vertical Displacement at UNAVCO Continuous GPS Stations

Minimum Thresholds & Measurable Objectives

Land Subsidence

- Evaluate monitoring data to develop minimum thresholds

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

Minimum Thresholds & Measurable Objectives

Land 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

- Set to the maximum observed annual land surface rise at each continuous GPS site
- Measurable objective same as minimum threshold
  - Goal is zero subsidence in Subbasin
  - Land surface fluctuation similar to observed is acceptable

Undesirable Results

Land Subsidence

- Undesirable results are

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.

- Potential causes of land subsidence
  - Shifting pumping to new locations in Subbasin that cause substantial groundwater level declines and local subsidence

SMC 5: Depletion of Interconnected Surface Water

- Surface water and groundwater in the Subbasin do not appear to be currently interconnected
- Expanded monitoring and data evaluation are needed to confirm interconnectivity
- Sustainable Management Criteria will be developed in future if interconnectivity is identified

Management Areas

- Management areas are not formally proposed in GSP yet
- Management area concept proposed by Shandon-San Juan GSA
  - Use geologic and geographic information to delineate management areas
- Sustainable Management Criteria
  - Goal is to manage groundwater sustainably in all management areas
  - Development process same as outlined in Chapter 9
- Expanded monitoring will be needed to support management areas

Questions about Sustainable Management Criteria

Appendices A, B, and C

Appendix A – Additional Well Logs Used to Supplement Cross Sections

Appendix B – Identification of Groundwater Dependent Ecosystems

Appendix C – Hydrographs

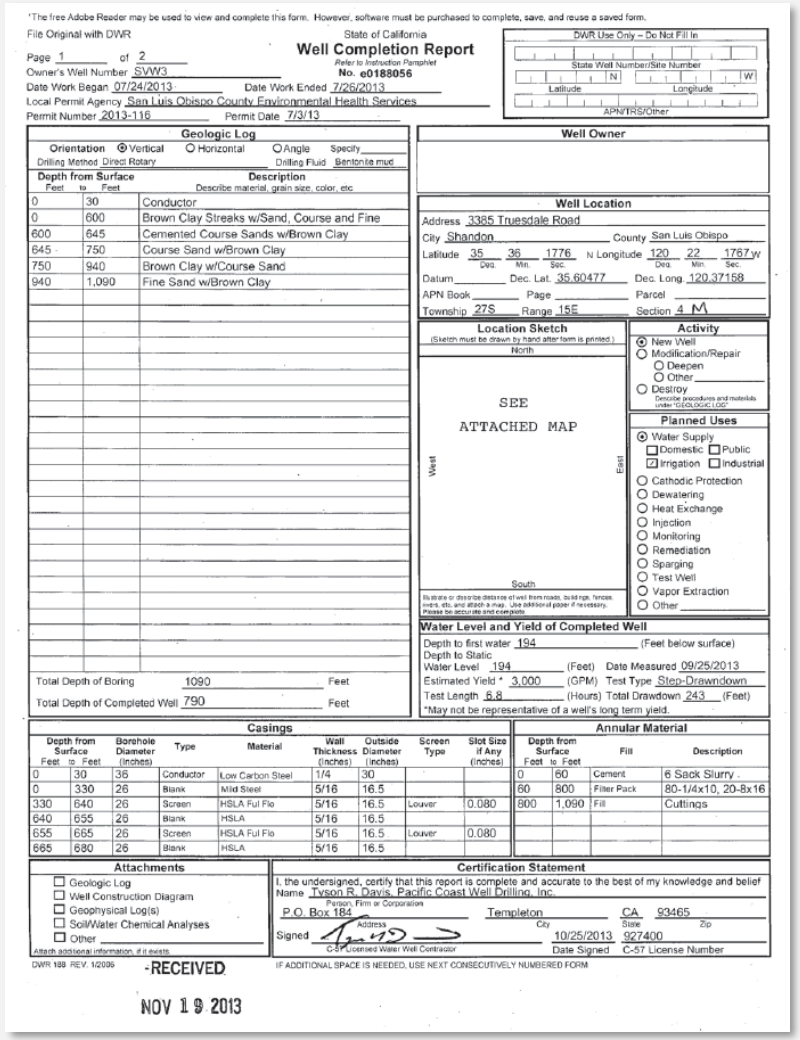
Appendix D – Summary of Model Update and Modifications

Appendix E – Monitoring Protocols

Appendix G – Hydrographs with Minimum Thresholds and Measurable Objectives

Appendix A – Well Logs

- Referenced in Chapter 4, Hydrogeologic Conceptual Model (HCM)
- Includes information about 6 wells
- Wells were used to update hydrogeologic 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 / Longitude
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
SEE ATTACHED MAP
West East
South
Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

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

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

Water Level and Yield of Completed Well
Depth to first water 194 (Feet below surface)
Depth to Static
Water Level 194 (Feet) Date Measured 09/25/2013
Estimated Yield * 3,000 (GPM) Test Type Step-Drawndown
Test Length 6.8 (Hours) Total Drawdown 243 (Feet)
*May not be representative of a well's long term yield.

Casings

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

Annular Material

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

Attachments
☐ Geologic Log
☐ Well Construction Diagram
☐ Geophysical Log(s)
☐ Soil/Water Chemical Analyses
☐ Other
Attach additional information, if it exists.

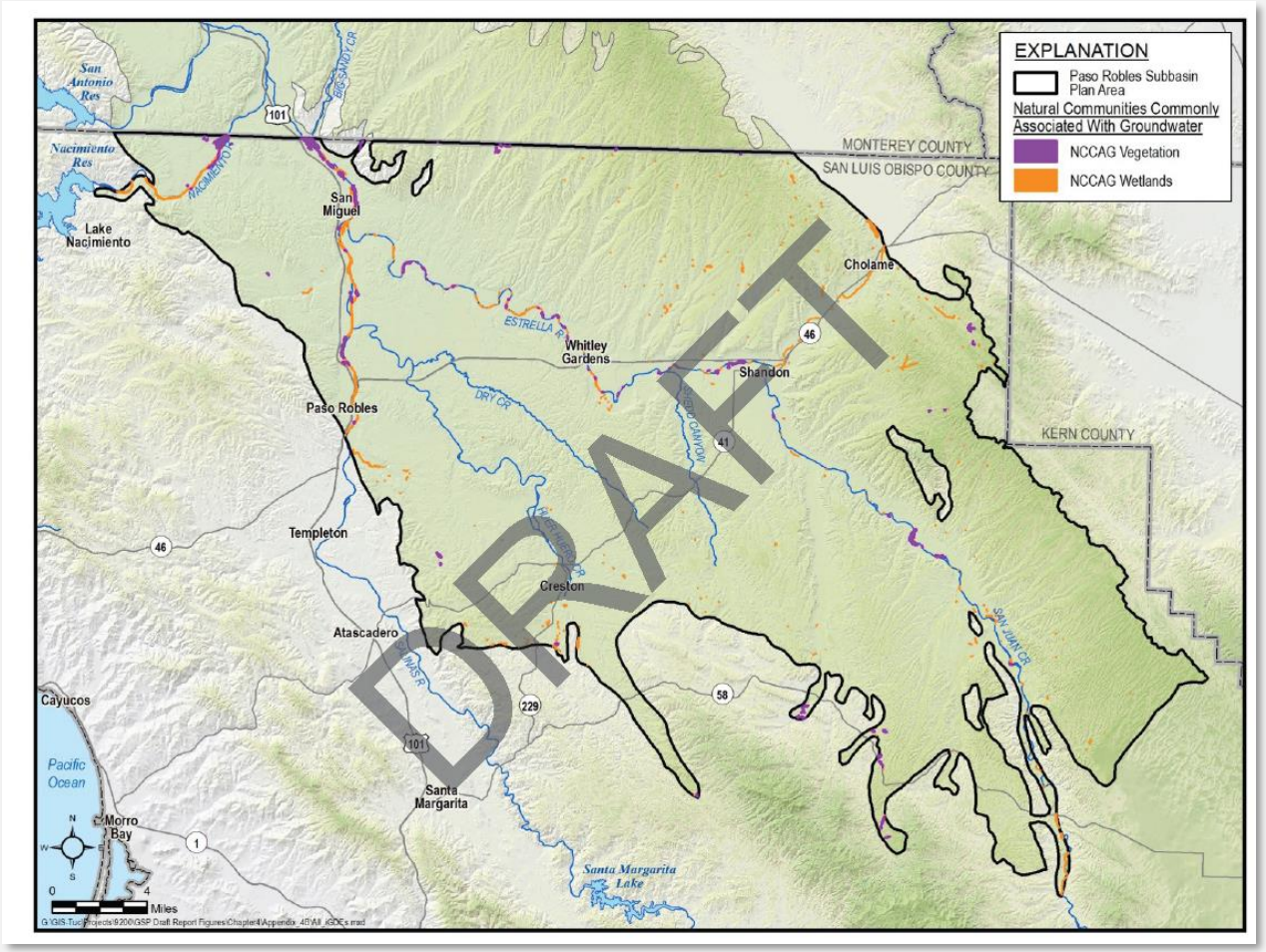
Certification Statement
I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief
Name Tyson R. Davis, Pacific Coast Well Drilling, Inc.
Person, Firm or Corporation
P.O. Box 184 Templeton CA 93465
Address City State Zip
Signed [signature] 10/25/2013 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
NOV 19 2013

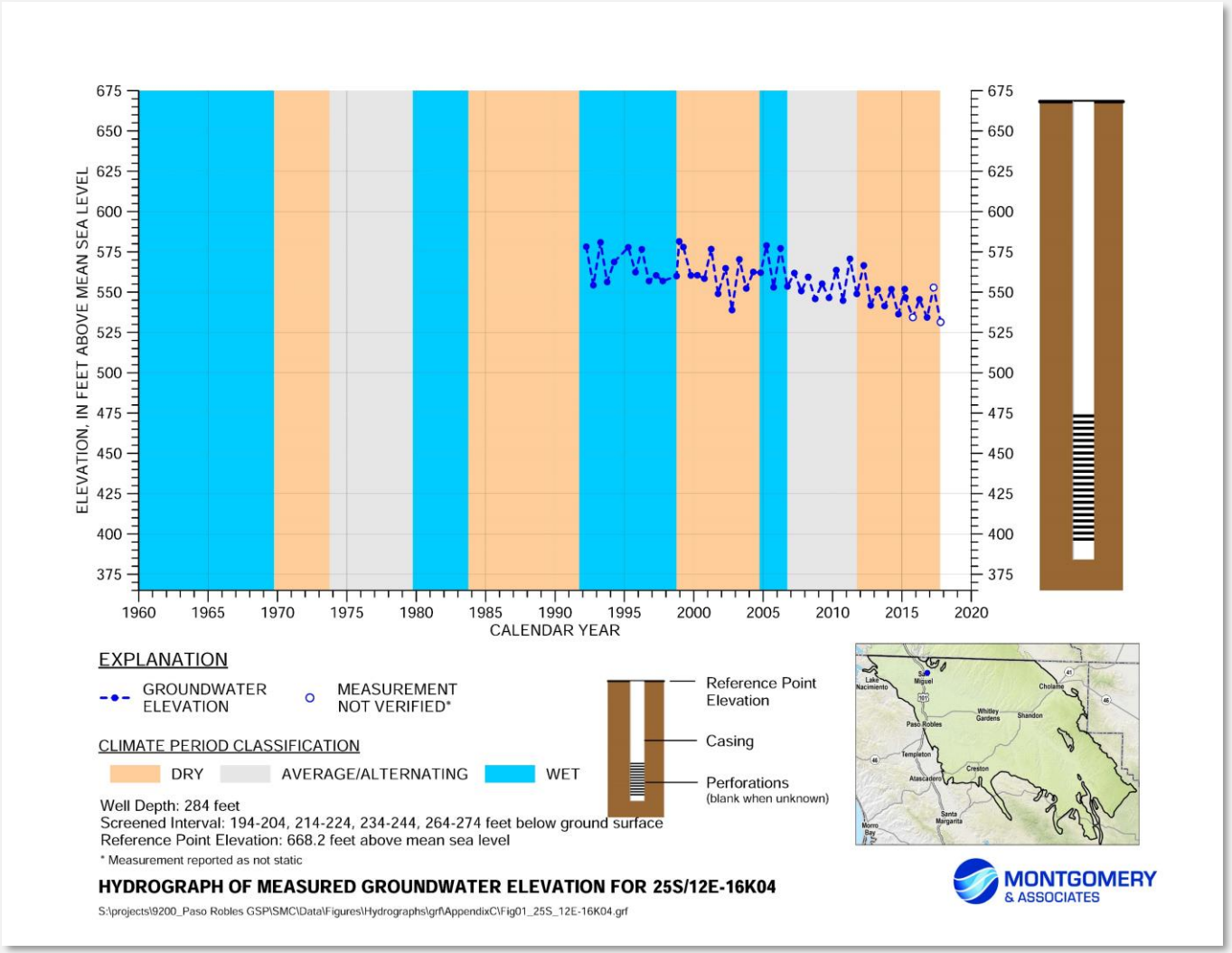
Appendix B – Groundwater Dependent Ecosystems (GDE)

- Referenced in Chapter 4, Hydrogeologic Conceptual Model
- Summary of methods and results of GDE identification in Subbasin
- Used approach developed by the Nature Conservancy
- Identifies **POTENTIAL** GDEs



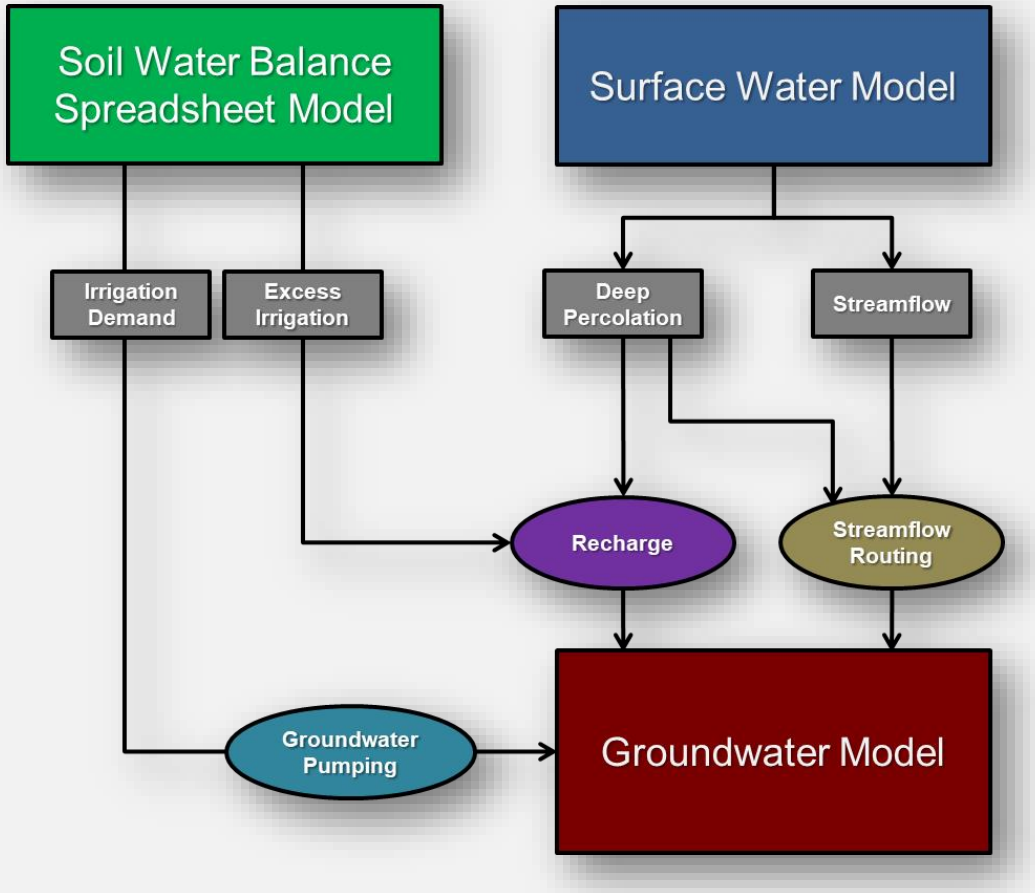
Appendix C – Hydrographs

- Referenced in Chapter 5, Groundwater Conditions
- Includes hydrographs for 18 wells with publicly available data



Appendix D – Summary of Model Update and Modifications

- Referenced in Chapter 6, Water Budgets
- Overview of model update process
- Comparison of previous and GSP groundwater budgets

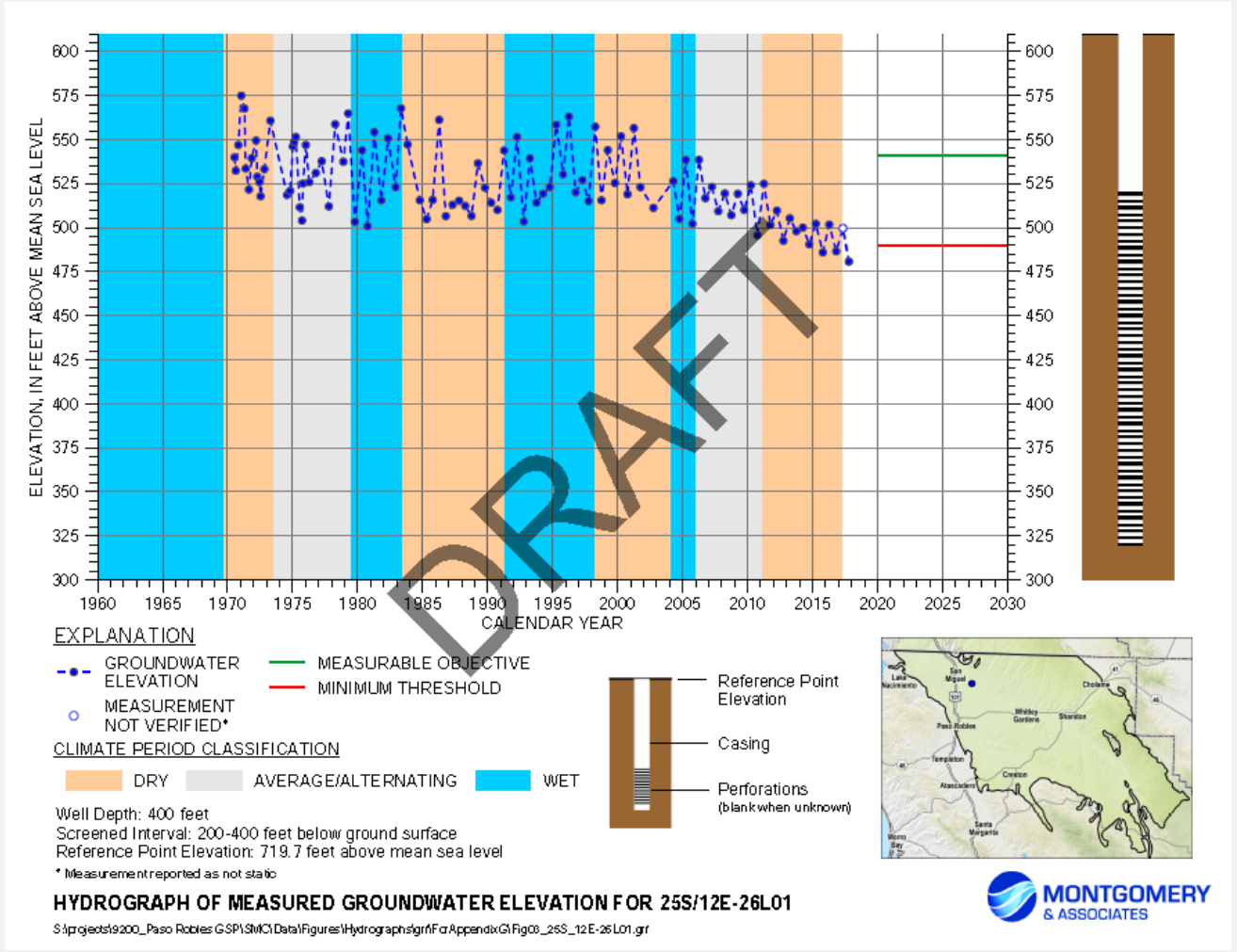


Appendix E – Monitoring Protocols

- Referenced in Chapter 7, Monitoring Networks
- Includes existing County monitoring protocols used in the Subbasin

Appendix G – Hydrographs with Minimum Thresholds and Measurable Objectives

- Referenced in Chapter 8, Sustainable Management Criteria
- Includes 12 hydrographs (public wells) with initial minimum thresholds and measurable objectives



Presentation Summary

- Water Budgets developed and support projects & actions (Chapter 9)
- Monitoring networks developed
- Initial Sustainable Management Criteria developed

Questions about Appendices