

# Groundwater Sustainability Plan

**JULY 2022** 







This page intentionally left blank.

TO: Paul Gosselin, California Department of Water Resources Deputy Director

FROM: Cuyama Basin Groundwater Sustainability Agency

DATE: July 6, 2022

RE: Revisions to Groundwater Sustainability Plan for the Cuyama Valley Groundwater Basin

Following submittal of the Groundwater Sustainability Plan (GSP) in January 2020, the Cuyama Valley Groundwater Basin Groundwater Sustainability Agency (CBGSA) received a Determination Letter (Letter) on January 21, 2022 (Supplemental Appendix A) from the California Department of Water Resources (DWR). The Letter provided the CBGSA with an Incomplete Determination for the GSP and the necessary corrective actions required for approval. Per SGMA regulations, the CBGSA was given a 180-day correction period to update and address any deficiencies in the GSP. DWR's Incomplete Determination identified four areas of deficiency that required revisions to and resubmittal of the GSP. The four deficiencies are summarized as follows:

- Potential Corrective Action 1: Provide justification for, and effects associated with, the sustainable management criteria and how they may affect beneficial users.
- Potential Corrective Action 2: Use of groundwater levels as a proxy for depletion of interconnected surface water.
- Potential Corrective Action 3: Further address degraded water quality by providing additional clarification and justification of available data, monitoring, and thresholds.
- Potential Corrective Action 4: Provide explanation for how overdraft will be mitigated in the basin.

To address these deficiencies, the CBGSA developed supplemental information that has been included in this revised version of the GSP. This information is included in a technical memorandum (Supplemental Appendix B) that describes the CBGSA's response to the Letter in detail, with relevant supplemental information inserted into this revised version of the GSP, including:

- Supplemental Table of Contents This is inserted at the end of the original Table of Contents and provides page numbers of the supplemental text sections.
- Supplemental GSP Subsections To ensure transparency, all revisions to the original GSP are included as supplemental subsections at the end of each applicable section. These supplemental subsections are on new pages separate from the original GSP, with text in **blue color font**, and with notes to identify what GSP subsections the supplemental information pertains to.

In addition, a recent review of the CBGSA January 2020 submittal to DWR revealed that an incorrect version of Section 7 was submitted to DWR at that time. To accurately reflect the direction of the CBGSA Board, the revised GSP includes the version of Section 7 that was originally approved by the Board in December 2019, with supplemental content added in response to DWR's determination letter as described above. To ensure full transparency and to assist DWR with its review, a pdf comparison between the version submitted to DWR and the version approved by the Board in December 2019 has been provided as Supplemental Appendix C.

The revised version of the GSP, including the supplemental content and appendices described above, was approved by the CBGSA Board on July 6, 2022.

Cuyama Basin GSA July 2022

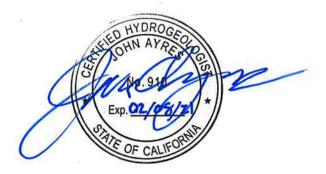




This page intentionally left blank.

## Cuyama Valley Groundwater Basin

## Groundwater Sustainability Plan



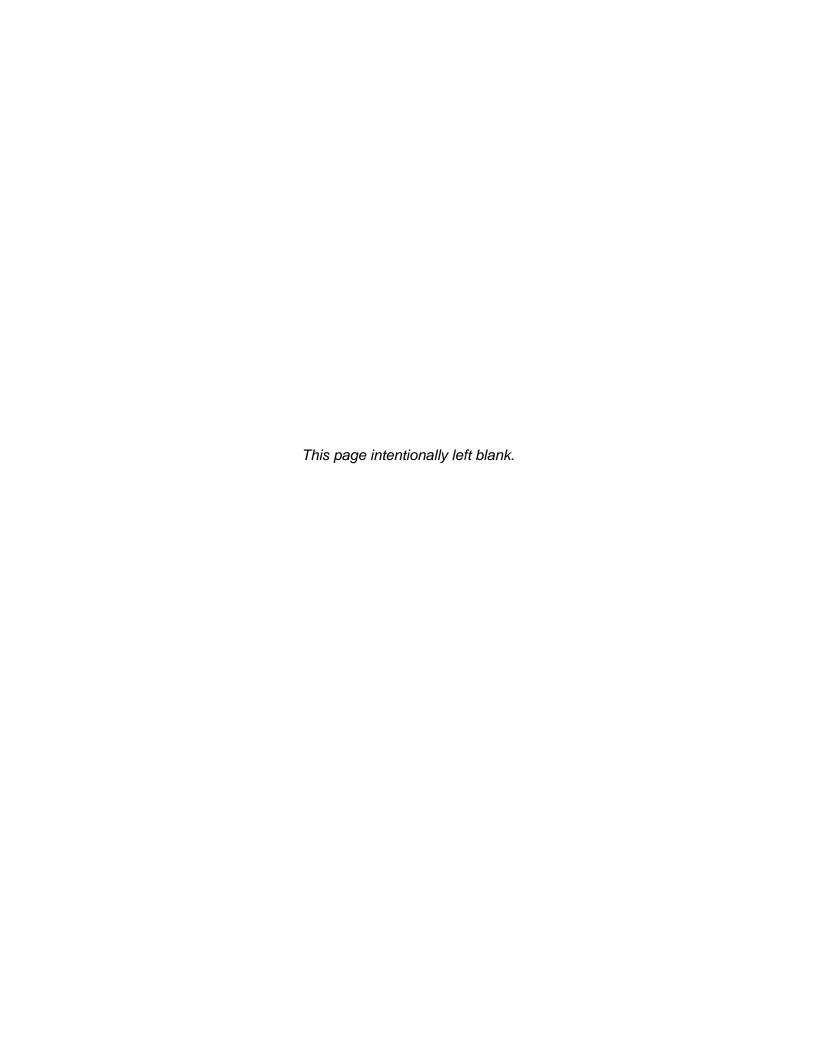


### Prepared by:





December 2019







#### **Table of Contents**

EXE	ECUTI	VE SUI	MMARY	ES-1
1.	AGE	ENCY II	NFORMATION, PLAN AREA, AND COMMUNICATION	1-1
	1.1	Introd	uction and Agency Information	1-1
		1.1.1	Contact Information	1-2
		1.1.2	Management Structure	1-2
		1.1.3	Legal Authority	1-3
	1.2	Plan A	\rea\	1-3
		1.2.1	Plan Area Definition	1-3
		1.2.2	Plan Area Setting	1-3
		1.2.3	Existing Surface Water Monitoring Programs	1-27
		1.2.4	Existing Groundwater Monitoring Programs	1-29
		1.2.5	Existing Water Management Programs	1-32
		1.2.6	General Plans in Plan Area	1-34
		1.2.7	Plan Elements from CWC Section 10727.4	1-45
	1.3	Notice	e and Communication	1-46
		1.3.1	Description of Beneficial Uses and Users of Groundwater	1-46
		1.3.2	List of Public Meetings Where the GSP was Discussed	1-50
		1.3.3	Comments Regarding the GSP Received by the CBGSA, Response Summary	1-50
		1.3.4	GSA Decision Making Process	
		1.3.5	Opportunities for Public Engagement and How Public Input was Used.	
		1.3.6	How GSA Encourages Active Involvement	
		1.3.7	Method of Informing the Public	
	1.4		ences	
2.			TTINGS: OVERVIEW	
	2.1		Settings: HCM	
			Useful Terms	
		2.1.2	Regional Geologic and Structural Setting	
		2.1.3	Geologic History	
		2.1.4	Geologic Formations/Stratigraphy	
		2.1.5	Faults and Structural Features	
		2.1.6	Basin Boundaries	
		2.1.7	Principal Aquifers and Aquitards	
		2.1.8	Natural Water Quality Characterization	
		2.1.9	Topography, Surface Water and Recharge	
			1 3 1 3,7 = 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	





		2.1.10	Hydrogeologic Conceptual Model Data Gaps	2-45
	2.2	Basin	Settings: Groundwater Conditions	2-45
		2.2.1	Useful Terms	2-48
		2.2.2	Groundwater Elevation Data Processing	2-49
		2.2.3	Groundwater Trends	2-59
		2.2.4	Change in Groundwater Storage	2-94
		2.2.5	Seawater Intrusion	2-95
		2.2.6	Land Subsidence	2-95
		2.2.7	Groundwater Quality	2-98
		2.2.8	Interconnected Surface Water Systems	2-112
		2.2.9	Groundwater Dependent Ecosystems	2-117
		2.2.10	Data Gaps	2-121
	2.3	Basin	Settings: Water Budget	2-121
	2.4	Refere	ences	2-142
		2.4.1	HCM References	2-142
		2.4.2	Groundwater Conditions References	2-145
3.	UNE	DESIRA	BLE RESULTS	3-1
	3.1	Sustai	nability Goal	3-1
	3.2	Undes	sirable Results Statements	3-1
		3.2.1	Chronic Lowering of Groundwater Levels	3-2
		3.2.2	Reduction of Groundwater Storage	3-3
		3.2.3	Seawater Intrusion	3-3
		3.2.4	Degraded Water Quality	3-4
		3.2.5	Land Subsidence	3-4
		3.2.6	Depletions of Interconnected Surface Water	3-5
	3.3	Evalua	ation of the Presence of Undesirable Results	3-6
		3.3.1	Chronic Lowering of Groundwater Levels	3-6
		3.3.2	Reduction of Groundwater Storage	3-6
		3.3.3	Seawater Intrusion	3-7
		3.3.4	Degraded Water Quality	3-7
		3.3.5	Land Subsidence	3-7
		3.3.6	Depletions of Interconnected Surface Water	3-8
	3.4	Refere	ences	3-8
4.	MOI	NITORII	NG NETWORKS	4-1
	4.1	Useful	l Terms	4-1
		4.1.1	Well-Related Terms	4-2





	4.1.2	Other Terms	4-2
4.2	Monito	oring Network Objectives	4-3
	4.2.1	Basin Conditions Relevant to Measurement Density and Frequency	4-4
4.3	Existir	ng Monitoring Used	4-6
	4.3.1	Groundwater Level Monitoring	4-6
	4.3.2	Overlapping and Duplicate Data	4-22
	4.3.3	Groundwater Quality Monitoring (Combined Existing Programs)	4-22
	4.3.4	Subsidence Monitoring	4-33
	4.3.5	Surface Water Monitoring	4-33
4.4	Monito	oring Rationales	4-35
4.5	Groun	dwater Level Monitoring Network	4-35
	4.5.1	Monitoring Wells Selected for Monitoring Network	4-35
	4.5.2	Monitoring Frequency	4-39
	4.5.3	Spatial Density	4-40
	4.5.4	Representative Monitoring	4-41
	4.5.5	Groundwater Level Monitoring Network	4-42
	4.5.6	Monitoring Protocols	4-48
	4.5.7	Data Gaps	4-48
	4.5.8	Plan to Fill Data Gaps	4-48
4.6	Groun	dwater Storage Monitoring Network	4-50
4.7	Seawa	ater Intrusion Monitoring Network	4-50
4.8	Degra	ded Groundwater Quality Monitoring Network	4-50
	4.8.1	Management Areas	4-50
	4.8.2	Monitoring Sites Selected for Monitoring Network	4-51
	4.8.3	Monitoring Frequency	4-51
	4.8.4	Spatial Density	4-51
	4.8.5	Representative Monitoring	4-52
	4.8.6	Groundwater Quality Monitoring Network	4-52
	4.8.7	Monitoring Protocols	4-58
	4.8.8	Data Gaps	4-58
	4.8.9	Plan to Fill Data Gaps	4-60
4.9	Land :	Subsidence Monitoring Network	4-60
	4.9.1	Management Areas	4-60
	4.9.2	Monitoring Sites Selected for Monitoring Network	4-60
	4.9.3	Monitoring Frequency	4-60
	4.9.4	Spatial Density	4-61





		4.9.5	Monitoring Protocols	4-63
		4.9.6	Data Gaps	4-63
		4.9.7	Plan to Fill Data Gaps	4-63
	4.10	Deple	tions of Interconnected Surface Water Monitoring Network	4-66
	4.11	Refere	ences	4-66
5.	MINI	MUM 1	THRESHOLDS, MEASURABLE OBJECTIVES,	
	AND		RIM MILESTONES	
	5.1		l Terms	
	5.2		ic Lowering of Groundwater Levels	
		5.2.1	Threshold Regions	
		5.2.2	Minimum Thresholds, Measurable Objectives, and Interim Milestones.	5-6
		5.2.3	Selected MT, MO, and IM Graphs, Figures, and Tables	5-9
	5.3	Reduc	ction of Groundwater Storage	5-15
		5.3.1	Threshold Regions	5-15
		5.3.2	Proxy Monitoring	5-15
	5.4	Seawa	ater Intrusion	5-15
	5.5	Degra	ded Water Quality	5-15
		5.5.1	Threshold Regions	5-16
		5.5.2	Proxy Monitoring	5-18
		5.5.3	Minimum Thresholds, Measurable Objectives, and Interim Milestones .	5-18
	5.6	Subsi	dencedence	5-23
		5.6.1	Threshold Regions	5-23
		5.6.2	Representative Monitoring	5-23
		5.6.3	Minimum Thresholds, Measurable Objectives, and Interim Milestones .	5-23
	5.7	Deple	tions of Interconnected Surface Water	5-26
	5.8	Refere	ences	5-26
6.	DAT	A MAN	IAGEMENT SYSTEM	6-1
	6.1	DMS	Overview	6-1
	6.2	DMS	Functionality	6-2
		6.2.1	User and Data Access Permissions	6-2
		6.2.2	Data Entry and Validation	6-4
		6.2.3	Visualization and Analysis	6-7
		6.2.4	Query and Reporting	6-8
	6.3	Data I	ncluded in the DMS	6-9
7.	PRO	JECTS	S AND MANAGEMENT ACTIONS	7-1
	7.1	Introd	uction	7-1
	7.2	Mana	gement Areas	7-1





	7.3	Overv	iew of Projects and Management Actions	7-3
		7.3.1	Addressing Sustainability Indicators	7-4
		7.3.2	Overdraft Mitigation	7-7
		7.3.3	Water Balance Management for Drought Preparedness	7-7
	7.4	Projec	cts	7-7
		7.4.1	Flood and Stormwater Capture	7-7
		7.4.2	Precipitation Enhancement	7-12
		7.4.3	Water Supply Transfers/Exchanges	7-17
		7.4.4	Improve Reliability of Water Supplies for Local Communities	7-19
	7.5	Water	Management Actions	7-22
		7.4.1	Basin-Wide Economic Analysis	7-22
		7.4.2	Pumping Allocations in Central Basin Management Area	7-24
	7.6	Adapt	ive Management	7-28
	7.7	Refere	ences	7-29
8.	IMP	LEMEN	ITATION PLAN	8-1
	8.1	Plan I	mplementation	8-1
		8.1.1	Implementation Schedule	8-1
	8.2	Impler	mentation Costs and Funding Sources	8-3
		8.2.1	GSP Implementation and Funding	
		8.2.2	Projects and Management Actions	8-4
	8.3	Annua	al Reports	8-7
		8.3.1	General Information	8-7
		8.3.2	Basin Conditions	8-7
		8.3.3	Plan Implementation Progress	8-8
	8.4	Five-Y	ear Evaluation Report	8-8
		8.4.1	Sustainability Evaluation	8-8
		8.4.2	Plan Implementation Progress	8-8
		8.4.3	Reconsideration of GSP Elements	8-8
		8.4.4	Monitoring Network Description	8-9
		8.4.5	New Information	8-9
		8.4.6	Regulations or Ordinances	8-9
		8.4.7	Legal or Enforcement Actions	
		8.4.8	Plan Amendments	
		8.4.9	Coordination	8-9





#### **Tables**

Table 1-1: USGS Surface Flow Gages in the Cuyama Basin	1-27
Table 1-2: Plan Elements from CWC Section 10727.4	1-45
Table 2-1: Summary of Hydraulic Conductivities in Aquifer Formations	2-30
Table 2-2: Stream Depletion by Reach	2-115
Table 2-3: Summary of Groundwater Budget Assumptions	2-127
Table 2-4: Average Annual Land Surface Water Budget	2-129
Table 2-5: Average Annual Groundwater Budget	2-130
Table 2-6: Current and Projected Average Annual Supply, Demand, and Change in Groundwater Storage by Water Year Type	2-137
Table 2-7: Average Annual Groundwater Budget for Sustainability Scenarios	2-142
Table 4-1: Well Identification Matrix	4-22
Table 4-2: Number of Wells Selected for Monitoring Network	4-37
Table 4-3: Monitoring frequency Based on Aquifer Properties and Degree of Use	4-39
Table 4-4: Monitoring Well Density Considerations	4-40
Table 4-5: Wells included in the Groundwater Levels and Storage Monitoring Network	4-43
Table 4-6: Groundwater Quality Monitoring Sites by Source	4-51
Table 4-7: Wells Included in the Groundwater Quality Monitoring Network	4-53
Table 5-1: Representative Monitoring Network and Sustainability Criteria	5-11
Table 5-2: MOs, MTs, and Interim Milestones for Groundwater Quality Representative TDS	
Table 6-1: Data Management System User Types/Access	6-3
Table 6-2: Data Collection Site Information	
Table 6-3: Data Types and Their Associated Parameters Configured in the DMS	6-10
Table 6-4: Sources of Data Included in the Data Management System	6-12
Table 7-1: Proposed Projects, Management Actions, and Adaptive Management Strate	egies7-3
Table 7-2: Summary of How Projects and Management Actions Address Sustainability Indicators	
Table 8-1: CBGSA and GSP Implementation Costs	
Table 8-2: Financing Options for Proposed Projects, Management Actions, and Adapti	
Management Strategies	





### **Figures**

Figure 1-1: Cuyama Valley Groundwater Basin	1-5
Figure 1-2: Cuyama Valley Groundwater Sustainability Agency Boundary	1-6
Figure 1-3: Neighboring Groundwater Basins	1-10
Figure 1-4: Counties Overlying Cuyama Basin	1-11
Figure 1-5: Non-County Jurisdictional Boundaries	1-12
Figure 1-6: 1996 Land Use	1-13
Figure 1-7: 2000 Land Use	1-14
Figure 1-8: 2003 Land Use	1-15
Figure 1-9: 2006 Land Use	1-16
Figure 1-10: 2009 Land Use	1-17
Figure 1-11: 2012 Land Use	1-18
Figure 1-12: 2014 Land Use	1-19
Figure 1-13: 2016 Land Use	1-20
Figure 1-14: Land Use by Water Source	1-21
Figure 1-15: Domestic Well Density and Average Depths	1-22
Figure 1-16: Production Well Density and Average Depths	1-23
Figure 1-17: Public Well Density and Average Depths	1-24
Figure 1-18: Federal and State Lands	1-25
Figure 1-19: Regional Watersheds	1-26
Figure 1-20: Surface Stream Flow Gages	1-28
Figure 1-21: Topics and Decision Process for GSP Development	1-52
Figure 2-1: Regional Geologic Setting	2-4
Figure 2-2: Geologic Map	2-7
Figure 2-3: Generalized Stratigraphic Column of the Cuyama Valley	2-9
Figure 2-4: Generalized Stratigraphic Diagram	2-9
Figure 2-5: Location of USGS 2015 Cross Sections	2-14
Figure 2-6: USGS Cross Section A-A'	2-15
Figure 2-7: USGS Cross Section B-B'	2-16
Figure 2-8: Major Faults	2-19
Figure 2-9: Geology with DeLong Overlay	2-24
Figure 2-10: Location of Aquifer Testing Well Sites	2-33
Figure 2-11: Location of USGS 2013 Groundwater Quality Sampling Sites	2-35
Figure 2-12: Piper Diagram for Well CVKR1-4	2-36
Figure 2-13: Location Map for Samples Used in Figure 2-12	
Figure 2-14: Piper Diagram of USGS 2013 Water Quality Sampling	2-37





Figure 2-15:	Location Map of USGS 2013 Sampling	2-37
Figure 2-16:	Topography	2-39
Figure 2-17:	Surface Water	2-40
Figure 2-18:	Recharge Areas and Springs	2-42
Figure 2-19:	Soils by Permeability	2-43
Figure 2-20:	Soils by Hydrologic Group	2-44
Figure 2-21:	Cuyama Basin Landmarks	2-47
Figure 2-22:	Cuyama Basin Wells with Monitoring Well provided by DWR	2-51
Figure 2-23:	Cuyama Basin Wells with Monitoring Data provided by USGS	2-52
Figure 2-24:	Cuyama Basin Wells with Monitoring Data provided by Local Agencies	2-53
Figure 2-25:	Cuyama Basin Wells with Monitoring Data provided by Private Landowners	2-55
Figure 2-26:	Cuyama Basin Wells by Last Measurement Date	2-56
Figure 2-27:	Central Cuyama Basin Wells and Hydrographs by Data Source	2-57
Figure 2-28:	Western Cuyama Basin Wells and Hydrographs by Data Source	2-58
Figure 2-29:	Water Level Drawdown Contours, 1966 to 1947	2-60
Figure 2-30:	1966 Water Level Contours	2-61
Figure 2-31:	Cuyama Groundwater Basin Hydrographs	2-64
Figure 2-32:	Cuyama Groundwater Basin Hydrographs in the Ventucopa Area of the Basin .	2-65
Figure 2-33:	Cuyama Groundwater Basin Historical Hydrographs in the Central Basin	2-66
Figure 2-34:	Cuyama Groundwater Basin Hydrographs in the Central Portion of the Basin	2-67
Figure 2-35:	Cuyama Groundwater Basin Hydrographs in the Westside Area of the Basin	2-68
Figure 2-36:	Hydrographs of CVFR1-4	2-71
•	Hydrographs of CVBR1-4	
Figure 2-38:	Hydrographs of CVKR1-4	2-73
Figure 2-39:	Cuyama Basin Wells by Groundwater Surface Elevation in Spring 2018	2-76
Figure 2-40:	Cuyama Basin Wells by Depth to Water in Spring 2018	2-77
Figure 2-41:	Fall 2017 Groundwater Elevation Contours	2-79
Figure 2-42:	Fall 2017 Depth to Water Contours	2-81
Figure 2-43:	Spring 2017 Groundwater Elevation Contours	2-83
Figure 2-44:	Spring 2017 Depth to Water Contours	2-85
Figure 2-45:	Spring 2015 Groundwater Elevation Contours	2-87
Figure 2-46:	Spring 2015 Depth to Water Contours	2-89
-	Fall 2014 Groundwater Elevation Contours	
Figure 2-48:	Fall 2014 Depth to Water Contours	2-93
Figure 2-49:	Cuyama Groundwater Storage by Year, Water Year Type, and Cumulative Water Volume	2-94





Figure 2-50: Locations of Continuous GPS and Reference InSAR Sites	2.00
in the Cuyama Valley	
Figure 2-51: Subsidence Monitoring Locations	
Figure 2-52: 1966 Average Well Measurements of Total Dissolved Solids	
Figure 2-53: 2011-2018 Average Well Measurements of Total Dissolved Solids	
Figure 2-54: Cuyama Groundwater Basin Historic TDS Levels in Selected Wells	
Figure 2-55: 1966 Average Well Measurements of Nitrate as Nitrogen	
Figure 2-56: 2011-2018 Average Well Measurements of Nitrate as Nitrogen	
Figure 2-57: 2008-2018 Average Well Measurements of Arsenic, ug/L	
Figure 2-58: Sites with Water Quality Concerns	
Figure 2-59: Locations of GAMA Sample Locations	
Figure 2-60: USGS 2013c Water Quality Monitoring Sites	
Figure 2-61: Assigned Surface Water Flow Reaches	
Figure 2-62: NCCAG Dataset in the Cuyama Basin	
Figure 2-63: Groupings Used in GDE Analysis	
Figure 2-64: Probable and Non-Probable GDEs	.2-120
Figure 2-65: Generalized Water Budget Diagram	.2-123
Figure 2-66: 50-Year Historical Precipitation and Cumulative Departure	
from Mean Precipitation	
Figure 2-67: Historical Average Annual Land Surface Water Budget	
Figure 2-68: Historical Land Surface Water Budget Annual Time Series	
Figure 2-69: Historical Average Annual Groundwater Budget	
Figure 2-70: Historical Groundwater Budget Annual Time Series	.2-133
Figure 2-71: Current and Projected Average Annual Land Surface Water Budget	.2-134
Figure 2-72: Current and Projected Land Surface Water Budget Annual Time Series	.2-134
Figure 2-73: Current and Projected Average Annual Groundwater Budget	.2-135
Figure 2-74: Current and Projected Groundwater Budget Annual Time Series	.2-136
Figure 2-75: Projected Average Annual Land Surface Water Budget with Climate Change	.2-138
Figure 2-76: Projected Land Surface Water Budget with Climate Change Annual Time Series	.2-138
Figure 2-77: Current and Projected Average Annual Groundwater Budget	.2-139
Figure 2-78: Current and Projected Groundwater Budget Annual Time Series	.2-140
Figure 4-1: Well Completion Diagram	4-1
Figure 4-2: Central Basin with Combined Hydrograph	4-5
Figure 4-3: Cuyama Groundwater Basin Wells with Monitoring Data Provided by DWR	4-8
Figure 4-4: Cuyama Groundwater Basin Wells with Monitoring Data Provided by USGS	
Figure 4-5: Cuyama Groundwater Basin Wells with Monitoring Data Provided by SBCWA.	4-13





Figure 4-6: Cuyama Groundwater Basin Wells with Monitoring Data Provided by SLOCFC&WCD	4-15
Figure 4-7: Cuyama Groundwater Basin Wells with Monitoring Data Provided by VCWPD	4-17
Figure 4-8: Cuyama Groundwater Basin Wells with Monitoring Data Provided by CCSD	4-19
Figure 4-9: Cuyama Groundwater Basin Wells with Monitoring Data Provided by Private	
Landowners	4-21
Figure 4-10: Cuyama Basin NWQMC, USGS, ILRP Water Quality Monitoring Sites	4-24
Figure 4-11: Cuyama Basin GAMA/DWR Groundwater Quality Monitoring Sites	4-26
Figure 4-12:Cuyama Basin CCSD Water Quality Monitoring Site	4-28
Figure 4-13: Cuyama Basin VCWPD Water Quality Sites	4-30
Figure 4-14: Cuyama Basin Landowner Water Quality Sites	4-32
Figure 4-15: Cuyama Basin Rivers, Streams, and Surface Flow Gages	4-34
Figure 4-16: Cuyama Well Tiering Criteria	4-36
Figure 4-17: Cuyama Basin Groundwater Level and Storage Monitoring  Network Wells by Tier	4-38
Figure 4-18: Groundwater Level and Storage Representative Wells, and Other Monitoring  Network Wells	
Figure 4-19: Groundwater Levels Monitoring Network Data Gap Areas	4-49
Figure 4-20: Cuyama Basin Groundwater Quality Monitoring Network Wells	4-57
Figure 4-21: Identification of Groundwater Quality Monitoring Data Gaps	4-59
Figure 4-22: Current Subsidence Monitoring Stations In and Around the Cuyama Basin	4-62
Figure 4-23: Subsidence Monitoring Location Data Gap Areas	4-65
Figure 5-1: Threshold Regions	5-4
Figure 5-2: Example Hydrograph	5-10
Figure 5-3: Groundwater Quality Representative Wells	5-17
Figure 5-4: Subsidence Representative Locations	5-25
Figure 6-1: Screenshot of Opti Platform	6-1
Figure 6-2: Screenshot of Opti Login Screen	6-4
Figure 6-3: Screenshot of Data Entry Tool Interface	6-6
Figure 6-4: DMS Map View	
Figure 7-1: CBGSA Management Areas	7-2
Figure 7-2: Groundwater Recharge Potential in Santa Barbara County	7-11
Figure 7-3: Potential Change in Groundwater Storage from Precipitation Enhancement	7-14
Figure 7-4: Glide Path for Central Basin Management Area Groundwater  Pumping Reductions	
Figure 8-1: Implementation Schedule	
,,	





#### **Appendices**

Appendices are organized by chapter at the end of this document.

#### **Chapter 1**

Appendix A
 Appendix B
 Appendix B
 Appendix C
 Appendix C
 Appendix D
 Appendix D

#### Chapter 2

- Appendix A Cuyama Valley Groundwater Basin Hydrographs
- Appendix B White Paper: Subsidence and Subsidence Monitoring Techniques
- Appendix C Cuyama Basin Water Resources Model Documentation
- Appendix D Technical Memorandum: Verification of NCCAG-Identified Locations

#### Chapter 4

- Appendix A Monitoring Protocols for Groundwater Level Monitoring Network
- Appendix B USGS Ground-Water Data-Collection Protocols and Procedures for the National Water-Quality Assessment Program: Collection and Documentation of Water-Quality Samples and Related Data

#### Chapter 5

Appendix A – Hydrographs Showing Minimum Thresholds, Measurable Objectives and Interim Milestones

#### Chapter 6

Appendix A – Cuyama Basin Data Management System Opti Data Public User Guide





#### **Acronyms**

μg/L micrograms per liter

AF acre-feet (foot)
AFY acre-feet per year

AHOGS automated high output ground seeding system site

Basin Cuyama Valley Groundwater Basin

BMP best management practice

CASGEM Program California Statewide Groundwater Elevation Monitoring Program

CBGSA Cuyama Basin Groundwater Sustainability Agency

CBWD Cuyama Basin Water District

CBWRM Cuyama Basin Water Resources Model

CCR California Code of Regulations

CCSD Cuyama Community Services District

CDFW California Department of Fish and Wildlife

CEDEN California Environmental Data Exchange Network

CEQA California Environmental Quality Act

CGPS continuous global positioning system

CMWC Cuyama Mutual Water Company
CUVHM Cuyama Valley Hydrologic Model

DEM digital elevation model

DMS data management system

DWR California Department of Water Resources

EKI Environment & Water, Inc.

EPA United States Environmental Protection Agency

GAMA Program California Groundwater Ambient Monitoring and Assessment Program

GDE groundwater dependent ecosystem

GPS global positioning system
GSE ground surface elevation

GSP Groundwater Sustainability Plan
HCM hydrogeologic conceptual model





#### **Acronyms**

ID identification number

ILRP Irrigated Lands Regulatory Program

IM interim milestone

InSAR interferometric synthetic aperture radar

IRWM Integrated Regional Water Management

LID low impact development

LiDAR light detection and ranging

Ma million years

MCL maximum contaminant level

mg/L milligrams per liter

MO measurable objective

MSC Master State Well Code

MT minimum threshold

NAVSTAR Original name for the Global Positioning System; satellite-based

radionavigation system owned by the United States government and

operated by the United States Air Force

NCCAG Natural Communities Commonly Associated with Groundwater

NEPA National Environmental Policy Act

NMFS National Marine Fisheries Service

NRCS Natural Resources Conservation Service

NWIS National Watershed Information System

NWQMC National Water Quality Monitoring Council

PBO Plate Boundary Observatory

PG&E Pacific Gas & Electric

PRISM Parameter-Elevation Regressions on Independent Slopes Model

RCD Resource Conservation District

RWQCB Regional Water Quality Control Board

SAGBI Soil Agricultural Groundwater Banking Index

SBCF Santa Barbara Canyon Fault

SBCWA Santa Barbara County Water Agency





#### **Acronyms**

SGMA Sustainable Groundwater Management Act

SLOCFC&WCD San Luis Obispo County Flood Control & Water Conservation District

SR State Route

TDS total dissolved solids

TSS Technical Support Services

UNAVCO University NAVSTAR Consortium, a non-profit, university-governed

consortium facilitating geoscience research and education using geodesy

USGS United States Geological Survey

VCWPD Ventura County Watershed Protection District

VWSC Ventucopa Water Supply Company

WDL Water Data Library

WMP Water Management Plan





## **Supplemental Table of Contents**

1.	AGENCY INFORMATION, PLAN AREA, AND COMMUNICATION	1-1		
	No supplemental text was added to Section 1 during the 2022 Update			
2.	BASIN SETTINGS: OVERVIEW	2-1		
	2.2.7 Groundwater Conditions: Groundwater Quality			
3.	UNDESIRABLE RESULTS			
	3.3 Evaluation of the Presence of Undesirable Results	3-9		
4.	MONITORING NETWORKS	4-1		
	4.10 Depletions of Interconnected Surface Water Monitoring Network			
5.	MINIMUM THRESHOLDS, MEASURABLE OBJECTIVES,			
	AND INTERIM MILESTONES	5-1		
	5.2 Chronic Lowering of Groundwater Levels			
	5.5 Degraded Water Quality			
6.	DATA MANAGEMENT SYSTEM			
	No supplemental text was added to Section 6 during the 2022 Update			
7.	PROJECTS AND MANAGEMENT ACTIONS			
	7.2 Management Areas			
	7.6 Adaptive Management			
8.	IMPLEMENTATION PLAN			
	No supplemental text was added to Section 8 during the 2022 Update			
Su	pplemental Tables			
	ole 2-8: Summary Statistics for Nitrate (as N) and Arsenic			
	ble 4-8: Interconnected Surface Water Monitoring Network			
	ble 5-3: Domestic and Production Wells and MT Summary Statisticsble 7-3: Eastern Region Groundwater Budget Summary (acre-feet per year)			
	pplemental Figures			
	5	0.446		
	ure 2-79: Average Well Measurements of Nitrate (as N) from 2010 through 2020ure 2-80: Average Well Measurements of Arsenic from 2010 through 2020			
	ure 4-24: Potential Stream Interconnectivity using Historical Modeled Groundwater	2-143		
	Levels in January 2015	4-69		
	ure 4-25: Interconnected Surface Water Monitoring Network			
	ure 5-5: Well Status Based on Minimum Threshold Analysisure 5-6: Change in Groundwater Levels in Northwestern Region from CBWRM Test	5-29		
. 191	Simulation	5-31		





#### **Supplemental Appendices**

#### 2022 Update

Appendix A – DWR "Incomplete" Determination of the 2020 Cuyama Valley Basin GSP

Appendix B – CBGSA Response to DWR's Determination Letter

Appendix C – PDF Comparison of Section 7 Versions (as Submitted vs Board Approved)

