5.2.1.2 Description of Refined Groundwater-level Monitoring Network for Groundwater Sustainability Plan Implementation

The GSP Implementation Network consists of a total of 96 wells within the contributing watershed areas, including 85 wells within the Subbasin itself (**Figures 5-1a** and **5-1b**). For the shallow aquifer system there are a total of 61 wells within the contributing watershed areas, including 57 wells within the Subbasin itself. Of the 61 shallow (less than 200 feet deep) wells in the GSP Implementation Network, 41 are dedicated monitoring wells (including municipal test wells), 2 are municipal supply wells, and 18 are private supply wells.

For the deep aquifer system there are a total of 35 wells within the contributing watershed areas, including 28 wells within the Subbasin itself. Of the 35 deep (greater than 200 feet deep) wells in the GSP Implementation Network, 15 are dedicated monitoring wells (including municipal test wells), 9 are municipal supply wells, and 11 are private supply wells. Details for wells in the GSP Implementation Network, including well construction, well use, and length of monitoring record are presented in **Tables 5-1a** and **5-1b**.

Monitoring frequencies for wells in the GSP Implementation Network are shown in **Tables 5-1a** and **5-1b**. Of the 96 wells in the GSP Implementation Network, 43 are high-frequency monitoring points with water-level data collected at least daily. Of the 43 high-frequency monitoring points, 22 are part of the shallow aquifer system monitoring network and 21 are part of the deep aquifer system monitoring network. The remaining 53 wells are monitored semiannually, with a subset of the wells monitored monthly.

5.2.1.3 Subbasin Boundary Groundwater-level Monitoring Network

To monitor boundary conditions, a Subbasin Boundary Groundwater-Level Monitoring Network (Boundary Network) has been developed. The Boundary Network includes wells that are outside of the Subbasin but within the contributing watershed areas included in the GSP Implementation Network and additional wells outside of the contributing watershed areas in adjacent groundwater basins and subbasins (**Figure 5-1c**). This network consists of 16 wells, including 8 wells in the Wilson Grove Formation Highlands Basin, 1 well in the Petaluma Valley Basin, 3 wells in the Rincon Valley Subbasin, 1 well in the Healdsburg Area Subbasin, 1 well in the Alexander Area Subbasin, and 2 wells outside of the defined basin/subbasin areas. Details for wells in the Boundary Network, including well construction, well use, monitoring frequency, and length of monitoring record are presented in **Tables 5-1a** and **5-1b**.

5.2.2 Groundwater Quality Monitoring Network

As described in **Section 4.8.2.1**, the Groundwater Quality Monitoring Network for the Subbasin is based on existing supply well monitoring programs. The GSA has identified sets of supply wells that are currently monitored (or are proposed to be monitored in the future) for various groundwater constituents and supply uses such as drinking water and irrigation water. Because these supply wells are monitored under different programs and may have different required sampling schedules (even under the same program), no one set of constituents will be sampled in all wells.

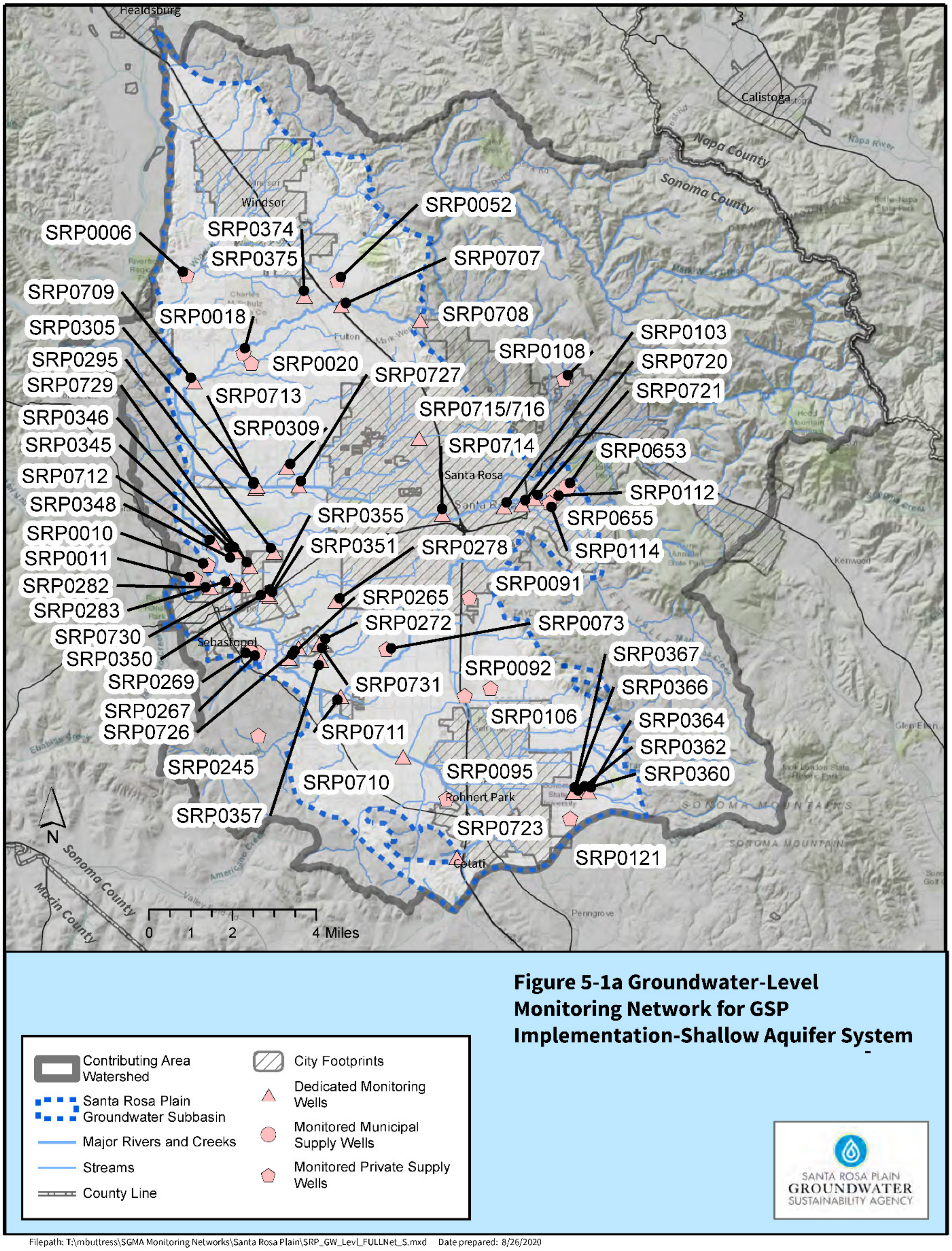


Figure 5-1a. Groundwater-level Monitoring Network for Groundwater Sustainability Plan Implementation – Shallow Aquifer System

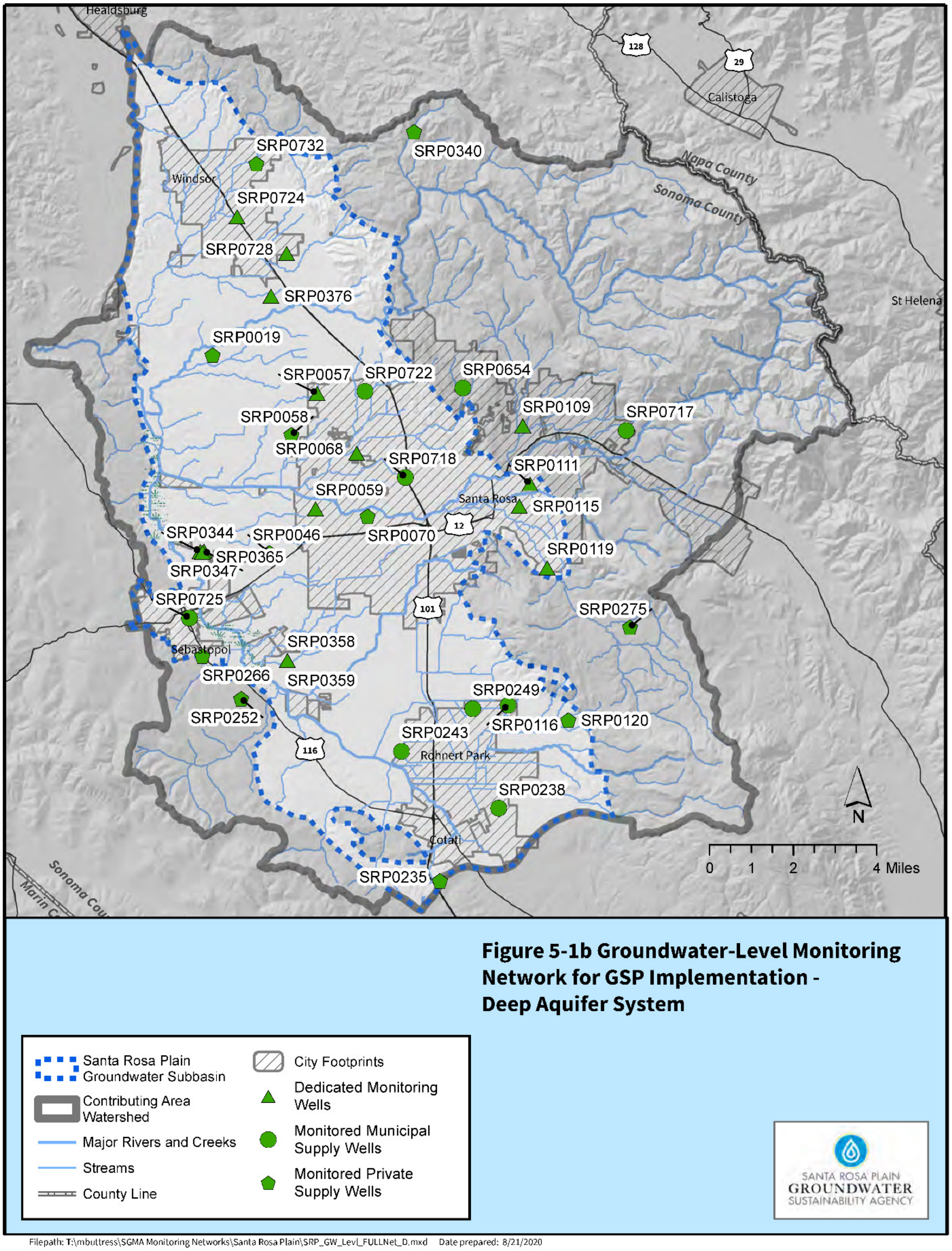
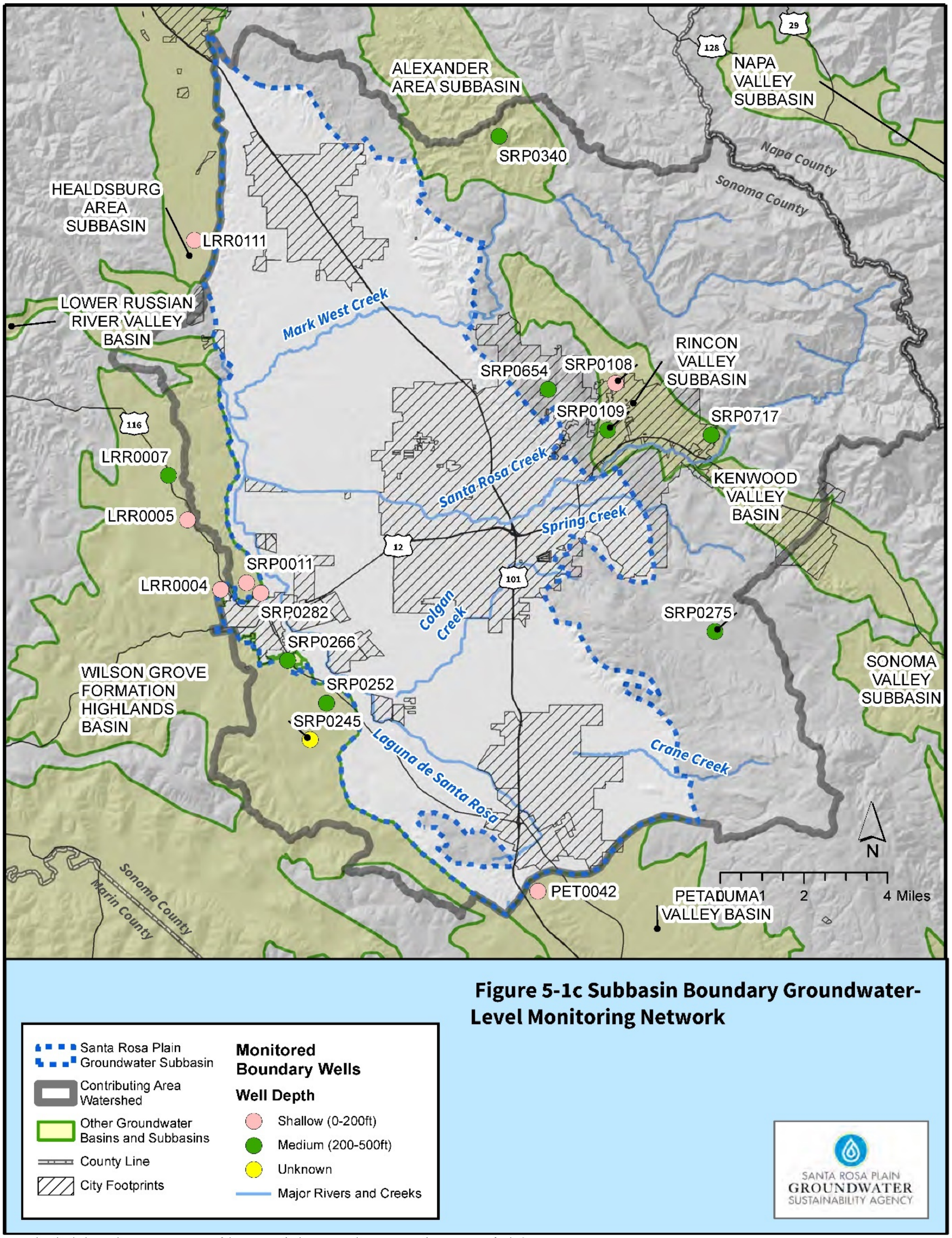


Figure 5-1b. Groundwater-level Monitoring Network for Groundwater Sustainability Plan Implementation – Deep Aquifer System



Filepath: T:\mbuttress\SGMA Monitoring Networks\Santa Rosa Plain\SRP_GW_Levl_BOUNDARY.mxd Date prepared: 6/24/2021

Figure 5-1c. Subbasin Boundary Groundwater-level Monitoring Network

Table 5-1a. Groundwater-level Monitoring Network for GSP Implementation - Shallow Aquifer System

Data Management System ID	Data Management System ID					Data Record	Data Record		
Station Name	Station Number	Type of Well	Well Depth[a] (feet)	Well Depth Category	Screened Interval(s)[a] (feet)	Data From	Data Until	Monitoring Frequency	Additional ID Information
Monitored Wells Inside the Santa Rosa Plain Groundwater Subbasin									
Sonoma Water Wells									
SRP0345	SCWA_OCC_MW_02	Observation	97	Shallow (0-200 feet)	60-80	3/27/2009	Present	Sub-Daily	
SRP0346	SCWA_OCC_MW_03	Observation	95	Shallow (0-200 feet)	67-87	7/16/2008	Present	Sub-Daily	
SRP0348	SCWA_OCC_MW_05	Observation	44	Shallow (0-200 feet)	30-50	6/28/2010	Present	Sub-Daily	
SRP0350	SCWA_SEB_MW_02	Observation	200	Shallow (0-200 feet)	170-190	6/28/2010	Present	Sub-Daily	
SRP0351	SCWA_SEB_MW_03	Observation	200	Shallow (0-200 feet)	164-190	6/1/2010	Present	Sub-Daily	
SRP0355	SCWA_SEB_MW_07	Observation	90	Shallow (0-200 feet)	70-90	2/14/2008	Present	Sub-Daily	
SRP0357	SCWA_TODD_RED	Observation	80	Shallow (0-200 feet)	60-80	6/1/1977	Present	Sub-Daily	
SRP0360	SCWA_Copeland_A-1	Observation	25	Shallow (0-200 feet)	19.88-24.88	5/5/2014	Present	Sub-Daily	
SRP0362	SCWA_Copeland_B-2	Observation	24	Shallow (0-200 feet)	17.56-22.56	12/27/2013	Present	Sub-Daily	
SRP0364	SCWA_Copeland_C-5	Observation	26	Shallow (0-200 feet)	11.4-26.4	5/5/2014	Present	Sub-Daily	
SRP0366	SCWA_Copeland_A-2	Observation	37	Shallow (0-200 feet)	20-35	5/15/2014	Present	Sub-Daily	
SRP0367	SCWA_Copeland_A-3	Observation	122	Shallow (0-200 feet)	105-120	5/15/2014	Present	Sub-Daily	
SRP0374	SCWA_Airport_MW_01	Observation	60	Shallow (0-200 feet)	40-60	4/25/2011	Present	Sub-Daily	383882N1228050W002, SRP-E07-01
SRP0375	SCWA_Airport_MW_02	Observation	140	Shallow (0-200 feet)	120-140	4/29/2011	Present	Sub-Daily	385117N1227863W001, SRP-E07-02
SRP0707	SRP-F07-04_Fulton	Observation	50.5	Shallow (0-200 feet)	30-50	11/21/2019	Present	Sub-Daily	Mark West Creek at Fulton Road
SRP0708	SRP-H07-01_Mark West	Observation	25.5	Shallow (0-200 feet)	15-25	11/21/2019	Present	Sub-Daily	Mark West Creek at Mark West Springs Road
SRP0709	SRP-C09-01_River Road	Observation	33.5	Shallow (0-200 feet)	23-33	11/25/2019	Present	Sub-Daily	Mark West Creek at River Road
SRP0710	SRP-H18-02_Stony	Observation	45.5	Shallow (0-200 feet)	35-45	11/21/2019	Present	Sub-Daily	Laguna de Santa Rosa at Stony Point Road

Data Management System ID	Data Management System ID					Data Record	Data Record		
Station Name	Station Number	Type of Well	Well Depth[a] (feet)	Well Depth Category	Screened Interval(s)[a] (feet)	Data From	Data Until	Monitoring Frequency	Additional ID Information
SRP0711	SRP-F16-01_Llano	Observation	45.5	Shallow (0-200 feet)	35-45	11/25/2019	Present	Sub-Daily	Colgan Creek at Llano Road
SRP0712	SRP-C13-03_Sanford	Observation	48.5	Shallow (0-200 feet)	28-48	11/25/2019	Present	Sub-Daily	Laguna de Santa Rosa at Occidental Road
SRP0713	SRP-D11-02_Willow	Observation	45.5	Shallow (0-200 feet)	25-45	11/25/2019	Present	Sub-Daily	Santa Rosa Creek at Willowside Road
SRP0714	SRP-H12-01_Pierson	Observation	51.5	Shallow (0-200 feet)	41-51	11/25/2019	Present	Sub-Daily	Santa Rosa Creek at Pierson St.
SRP0715	SRP-H10-04_Hardies	Observation	40.5	Shallow (0-200 feet)	30-40	11/25/2019	Present	Sub-Daily	Paulin Creek at Hardies Ln.
SRP0716	SRP-H10-04s_Hardies	Observation	20.5	Shallow (0-200 feet)	15-20	11/25/2019	Present	Sub-Daily	Paulin Creek at Hardies Ln - Shallow
City of Santa Rosa Wells									
SRP0103	SRP-J12-02	Observation	200	Shallow (0-200 feet)	130-180	11/9/2011	Present	Sub-Daily	DOYLE PARK
SRP0265	383862N1227919W001	Observation	35	Shallow (0-200 feet)	10-34	5/23/2007	10/10/2019	Semiannually	SRP-05, RECMW101
SRP0272	383913N1227789W001	Observation	40	Shallow (0-200 feet)	?	5/23/2007	10/10/2019	Semiannually	SRP-13, RECMW103
SRP0278	384064N1227713W001	Observation	32	Shallow (0-200 feet)	8-30	5/23/2007	10/14/2019	Semiannually	SRP-06, RECMW104
SRP0283	384130N1228169W001	Observation	42	Shallow (0-200 feet)	10-40	5/29/2007	10/14/2019	Semiannually	SRP-08, RECMW108
SRP0295	384232N1227996W001	Observation	45	Shallow (0-200 feet)	11-45	5/24/2007	10/11/2019	Semiannually	SRP-07, RECMW105
SRP0305	384456N1228066W001	Observation	42	Shallow (0-200 feet)	10-40	5/24/2007	10/14/2019	Semiannually	SRP-10, RECMW110
SRP0309	384525N1227929W001	Observation	42	Shallow (0-200 feet)	10-40	5/24/2007	10/7/2019	Semiannually	SRP-11, RECMW111
SRP0653		Municipal	160	Shallow (0-200 feet)	?	10/12/1949	11/8/2019	Monthly	PETER SPRING WELL
SRP0655		Municipal	208	Shallow (0-200 feet)	50-190	10/1/1948	11/8/2019	Monthly	CARLEY WELL
SRP0720		Observation	115	Shallow (0-200 feet)	?	4/1/2005	11/8/2019	Monthly	HOEN
SRP0721		Observation	150	Shallow (0-200 feet)	?	4/1/2005	11/8/2019	Monthly	PATIO
SRP0723	RECMW114	Observation	37.5	Shallow (0-200 feet)	?	5/30/2007	10/10/2019	Semiannually	RECMW114
SRP0726	RECMW102	Observation	36.3	Shallow (0-200 feet)	?	5/23/2007	10/10/2019	Semiannually	RECMW102

Data Management System ID	Data Management System ID					Data Record	Data Record		
Station Name	Station Number	Type of Well	Well Depth[a] (feet)	Well Depth Category	Screened Interval(s)[a] (feet)	Data From	Data Until	Monitoring Frequency	Additional ID Information
SRP0727	RECMW112	Observation	27.9	Shallow (0-200 feet)	?	5/29/2007	10/11/2019	Semiannually	RECMW112
SRP0729	RECMW106	Observation	47	Shallow (0-200 feet)	?	5/24/2007	10/7/2019	Semiannually	RECMW106
SRP0730	RECMW107	Observation	29.1	Shallow (0-200 feet)	?	5/30/2012	10/11/2019	Semiannually	RECMW107
SRP0731	RECMW115	Observation	90.3	Shallow (0-200 feet)	?	5/23/2007	10/10/2019	Semiannually	RECMW115
Volunteer/Other Wells									
SRP0006	SRP-B06-02	Unknown	145	Shallow (0-200 feet)	?	11/1/1989	3/22/2017	Semiannually	08N09W22R001M
SRP0010	SRP-C13-02	Unknown	110	Shallow (0-200 feet)	?	4/26/2012	12/19/2019	Semiannually	07N09W26P001M
SRP0018	SRP-D08-01	Unknown	89	Shallow (0-200 feet)	?	3/16/1976	12/9/2019	Semiannually	08N09W36N001M
SRP0020	SRP-D08-03	Unknown	110	Shallow (0-200 feet)	?	3/26/1970	12/9/2019	Semiannually	07N09W01C001M
SRP0052	SRP-F06-01	Unknown	95	Shallow (0-200 feet)	?	11/8/1989	12/9/2019	Semiannually	08N08W29C003M
SRP0073	SRP-G15-01	Unknown	80	Shallow (0-200 feet)	?	11/3/1989	3/21/2017	Semiannually	06N08W04Q001M
SRP0091	SRP-I14-03	Unknown	205	Shallow (0-200 feet)	?	11/9/1989	12/19/2019	Semiannually	07N08W35K001M
SRP0092	SRP-I16-01	Unknown	120	Shallow (0-200 feet)	?	11/9/1989	12/19/2019	Monthly	06N08W11P001M
SRP0095	SRP-I19-01	Unknown	82	Shallow (0-200 feet)	?	11/3/1989	3/20/2017	Semiannually	06N08W27H001M
SRP0106	SRP-J16-01	Unknown	90	Shallow (0-200 feet)	?	10/3/1989	3/11/2020	Semiannually	06N08W12M001M
SRP0112	SRP-K12-01	Unknown	85	Shallow (0-200 feet)	?	11/8/1989	12/19/2019	Semiannually	07N07W19B001M
SRP0114	SRP-K12-03	Unknown	68	Shallow (0-200 feet)	?	11/8/1989	12/19/2019	Semiannually	07N07W19F002M
SRP0121	SRP-L19-01	Unknown	150	Shallow (0-200 feet)	?	11/9/1989	11/26/2019	Monthly	06N07W30R001M
SRP0267	383882N1228050W001	Municipal	205	Shallow (0-200 feet)	113-193	10/24/2009	10/13/2019	Semiannually	SRP-14
SRP0269	383889N1228088W001	Unknown	160	Shallow (0-200 feet)	100-160	5/23/2009	10/13/2019	Semiannually	WGFH-08

Data Management System ID	Data Management System ID					Data Record	Data Record		
Station Name	Station Number	Type of Well	Well Depth[a] (feet)	Well Depth Category	Screened Interval(s)[a] (feet)	Data From	Data Until	Monitoring Frequency	Additional ID Information
Monitored Wells Outside of the Subbasin but Within the Contributing Watershed Area									
City of Santa Rosa Wells									
SRP0282	384101N1228271W001	Observation	61	Shallow (0-200 feet)	26-60	5/31/2012	10/14/2019	Semiannually	SRP-09, RECMW109
Volunteer/Other Wells									
SRP0011	SRP-C14-01	Unknown	167	Shallow (0-200 feet)	?	3/25/1970	12/19/2019	Semiannually	07N09W35D002M
SRP0108	SRP-K09-01	Unknown	100	Shallow (0-200 feet)	?	11/8/1989	12/19/2019	Semiannually	07N07W06H002M
SRP0245	383594N1228048W001	Unknown	?	Unknown	?	11/7/2011	10/15/2019	Semiannually	WGFH-01
Additional Boundary Wells Outside of the Contributing Watershed Area									
LRR0004	384111N1228448W001	Unknown	76	Shallow (0-200 feet)	?	4/26/2012	2/8/2021	Monthly	07N09W34F001M
LRR0005	384351N1228597W001	Unknown	160	Shallow (0-200 feet)	?	11/7/2011	10/28/2020	Semiannually	WGFH-06
LRR0111	SCWA_MW_02B	Observation	195	Shallow (0-200 feet)	175-195	9/13/2013	Present	Hourly	
PET0042	383076N1227041W001	Unknown	155	Shallow (0-200 feet)	30-150	2/3/1976	2/9/2021	Monthly	05N08W02H001M

[a] Well depth and screened interval(s) reported in feet below top-of-casing

Table 5-1b. Groundwater-level Monitoring Network for GSP Implementation - Deep Aquifer System

Data Management System ID	Data Management System ID					Data Record	Data Record		
Station Name	Station Number	Type of Well	Well Depth[a] (feet)	Well Depth Category	Screened Interval(s)[a] (feet)	Data From	Data Until	Monitoring Frequency	Additional ID Information
Monitored Wells Inside the Santa Rosa Plain Groundwater Subbasin									
Sonoma Water Wells									
SRP0344	SCWA_OCC_MW_01	Observation	300	Medium (200-500 feet)	?	6/28/2010	Present	Sub-Daily	
SRP0347	SCWA_OCC_MW_04	Observation	300	Medium (200-500 feet)	?	6/28/2010	Present	Sub-Daily	
SRP0358	SCWA_TODD_BLUE	Observation	250	Medium (200-500 feet)	?	6/1/1977	Present	Sub-Daily	
SRP0359	SCWA_TODD_WHITE	Observation	257	Medium (200-500 feet)	237-257	8/2/1979	Present	Sub-Daily	
SRP0376	SCWA_Airport_MW_03	Observation	360	Medium (200-500 feet)	340-360	4/25/2011	Present	Sub-Daily	385117N1227863W002, SRP-E07-03
SRP0365	SCWA_OCC_MW_06	Observation		Unknown	?	9/14/2012	Present	Sub-Daily	
City of Santa Rosa Wells									
SRP0057	SRP-F09-02	Observation	360	Medium (200-500 feet)	200-350	5/20/2011	Present	Sub-Daily	NORTHWEST VILLAGE
SRP0059	SRP-F12-01	Observation	694	Medium (200-500 feet)	199-684	5/20/2011	Present	Sub-Daily	PLACE TO PLAY
SRP0119	SRP-L13-01	Observation	380	Medium (200-500 feet)	350-370	5/8/2012	Present	Sub-Daily	GALVIN
SRP0722		Municipal	275	Medium (200-500 feet)	?	11/6/2013	Present	Sub-Daily	W6 SHARON PARK
SRP0111	SRP-K11-01	Observation	660	Deep (>500 feet)	600-650	11/9/2011	Present	Sub-Daily	SLATER
SRP0115	SRP-K12-04	Observation	870	Deep (>500 feet)	500-860	4/22/2010	Present	Sub-Daily	MARTHA WAY
SRP0718		Municipal	817	Deep (>500 feet)	107-817	10/7/2013	Present	Sub-Daily	W3 FREEWAY
SRP0068	SRP-G11-01	Observation	694	Unknown	156-684	5/23/2011	Present	Sub-Daily	NORTHWEST COMMUNITY PARK
City of Rohnert Park Wells									
SRP0117	SRP-K19-01	Municipal	380	Medium (200-500 feet)	130-380	11/1/1991	3/14/2019	Daily	CASGEM ID: 383350N1226841W001, RP Well 37
SRP0107	SRP-J17-01	Municipal	462	Medium (200-500 feet)	302-462	9/1/1980	3/14/2019	Daily	CASGEM ID: 383694N1226960W001, RP Well 17
SRP0081	SRP-H18-01	Municipal	582	Deep (>500 feet)	258-582	3/1/1982	10/1/2017	Daily	CASGEM ID: 383544N1227271W001, RP Well 24
SRP0116	SRP-K17-01	Municipal	540	Deep (>500 feet)	297-540	12/1/1985	10/1/2017	Daily	CASGEM ID: 383706N1226803W001, RP Well 26
City of Sebastopol Wells									
SRP0725	Sebastopol Well #5	Municipal	528	Deep (>500 feet)	138-528	2/1/2007	Present	Sub-Daily	Sebastopol Well #5
Town of Windsor Wells									
SRP0724	Bluebird_Windsor	Observation	765	Deep (>500 feet)	695-745	6/16/2020	6/16/2020	Semiannually	BLUEBIRD WELL
SRP0728	Esposti_Windsor	Observation	670	Deep (>500 feet)	380-655	NM	NM	Semiannually	ESPOSTI PARK WELL
Volunteer/Other Wells									
SRP0019	SRP-D08-02	Unknown	1048	Deep (>500 feet)	?	3/16/1976	12/9/2019	Semiannually	08N09W36P001M
SRP0046	SRP-E13-01	Unknown	290	Medium (200-500 feet)	?	1/17/2012	9/21/2017	Semiannually	07N08W30K001M
SRP0058	SRP-F10-01	Unknown	220	Medium (200-500 feet)	?	11/1/1989	12/9/2019	Semiannually	07N08W08M001M

Data Management System ID	Data Management System ID					Data Record	Data Record		
Station Name	**Station Number**	**Type of Well**	**Well Depth[a] (feet)**	**Well Depth Category**	**Screened Interval(s)[a] (feet)**	**Data From**	**Data Until**	**Monitoring Frequency**	**Additional ID Information**
SRP0070	SRP-G12-01	Unknown	360	Medium (200-500 feet)	?	12/20/1989	12/19/2019	Semiannually	07N08W21J001M
SRP0120	SRP-L17-01	Unknown	370	Medium (200-500 feet)	?	11/9/1989	12/19/2019	Semiannually	06N07W17G001M
SRP0235	383096N1227098W001	Domestic	419	Medium (200-500 feet)	118-418	6/12/2015	10/22/2019	Semiannually	St. John
SRP0732	Foothills_Windsor	Irrigation	350	Medium (200-500 feet)	160-350	6/16/2020	6/16/2020	Semiannually	Foothills of Windsor Well
Monitored Wells Outside of the Subbasin but Within the Contributing Watershed Area									
City of Santa Rosa Wells									
SRP0109	SRP-K10-01	Observation	470	Medium (200-500 feet)	390-460	11/9/2011	Present	Sub-Daily	MADRONE
SRP0654		Municipal	323	Medium (200-500 feet)	?	4/2/1997	11/8/2019	Monthly	LEETE WELL
SRP0717		Municipal	316	Medium (200-500 feet)	?	11/1/2014	Present	Sub-Daily	BRIGADOON
Volunteer/Other Wells									
SRP0252	383722N1227978W001	Unknown	220	Medium (200-500 feet)	?	5/23/2009	10/13/2019	Semiannually	WGFH-10
SRP0266	383868N1228151W001	Unknown	260	Medium (200-500 feet)	130-250	5/23/2009	10/13/2019	Semiannually	WGFH-11
SRP0275	383980N1226270W001	Unknown	254	Medium (200-500 feet)	234-254	11/9/1989	12/19/2019	Semiannually	
SRP0340	385690N1227238W001	Unknown	440	Medium (200-500 feet)	100-120, 260-440	5/17/2010	10/23/2019	Semiannually	AVAA-03
Additional Boundary Wells Outside the Contributing Watershed Area									
LRR0007	384505N1228683W001	Unknown	225	Medium (200-500 feet)	?	4/26/2012	2/4/2021	Monthly	07N09W16M001M

[a] Well depth and screened interval(s) reported in feet below top-of-casing

The following existing monitoring programs are included in the Groundwater Quality Monitoring Network:

- Public supply wells, regulated by the SWRCB DDW. Public drinking water supply wells are included in the Groundwater Quality Monitoring Network because they are routinely sampled to meet CCR Title 22 water quality reporting requirements as regulated by the SWRCB DDW. Title 22 analyses include arsenic, nitrate, and TDS, which are the Subbasin COCs. This dataset can be obtained from the SWRCB through the GAMA online portal.

- Monitoring wells, agricultural irrigation supply, and public drinking water supply wells are included in the water quality network in the SNMP (City of Santa Rosa 2013a). The MRP, regulated by the SWRCB, requires annual sampling and analysis of water quality constituents in a network of wells (City of Santa Rosa 2020). The monitoring network includes two monitoring wells, three irrigation wells, and six public supply wells. The six public supply wells proposed for the MRP are already included in the DDW dataset described previously. Per the MRP, each of the wells is required to be sampled annually and analyzed for nitrate and TDS. The analytical datasets from the MRP wells will be available from the SWRCB through the GAMA online portal.

Existing and future water quality monitoring programs may be used to help collect data during GSP implementation and establish consistency with other programs. This includes the North Coast Water Board’s dairy program that started in 2020 but has yet to upload groundwater quality data to publicly available databases. There are not currently any identified data gaps in the Groundwater Quality Monitoring Network. Additional water quality monitoring networks will be developed specifically for monitoring projects and management actions during GSP implementation.

5.2.3 Surface Water Monitoring Network

The surface water monitoring network in the Subbasin has been developed with the following objectives:

- Quantify inflow and outflow of surface water to and from the Subbasin
- Characterize spatial and temporal exchanges between surface water and groundwater
- Calibrate the tools and methods necessary to calculate depletions of surface water caused by groundwater extraction

There are nine active stream gages operated by the USGS and partner agencies located in the Subbasin and contributing watershed areas. The USGS gages provide a well-distributed stream monitoring network with data records extending back to between 1998 and 2006. Additional surface water monitoring stations include nine OneRain gages operated by Sonoma Water. Details for the stream gages including parameters measured and length of data record are included in **Table 5-2**. The locations of the stream gages are shown on **Figure 5-2**.

Table 5-2. Surface Water Monitoring Network

USGS ID	Location Description	Parameters Measured	Data Record From	Data Record Until	Continuous/ Seasonal[a]	Adjacent Shallow Monitoring Well
11466320	Santa Rosa Creek at Willowside Road near Santa Rosa, CA	Discharge, Stream Stage	12/10/1998	Present	Continuous	SRP0713
11466200	Santa Rosa Creek at Santa Rosa, CA	Discharge, Stream Stage	12/1/2001	Present	Seasonal	SRP0714
11466170	Matanzas Creek at Santa Rosa, CA	Discharge, Stream Stage	10/1/2004	Present	Seasonal	
11465660	Copeland Creek at Rohnert Park, CA	Discharge, Stream Stage	10/20/2006	Present	Seasonal	
11465680	Laguna de Santa Rosa at Stony Point Road near Cotati, CA	Discharge, Stream Stage	11/7/1998	Present	Continuous	SRP0710
11465690	Colgan Creek near Santa Rosa, CA	Discharge, Stream Stage	10/1/2006	Present	Seasonal	
11465700	Colgan Creek near Sebastopol, CA	Discharge, Stream Stage	11/8/1998	Present	Continuous	SRP0711
11465750	Laguna de Santa Rosa near Sebastopol, CA	Discharge, Stream Stage	11/19/1998	Present	Continuous	SRP0712
11466800	Mark West Creek near Mirabel Heights, CA	Discharge, Stream Stage	12/10/2005	Present	Continuous	
	Brush Creek at Badger Road	Stream Stage, Precipitation	2018	Present	Continuous	
	Brush Creek at Middle Fork Dam	Stream Stage, Water Temperature, Precipitation	2018	Present	Continuous	
	Linda Creek at Mark West Springs Road	Stream Stage	2018	Present	Continuous	
	Mark West Creek at Michele Way	Discharge, Stream Stage, Precipitation	2018	Present	Continuous	
	Piner Creek at Hopper Avenue	Stream Stage, Precipitation	2018	Present	Continuous	
	Spring Lake	Lake Stage, Water Temperature, Precipitation	2018	Present	Continuous	
	Spring Creek at Diversion	Stream Stage, Precipitation	2018	Present	Continuous	
	Matanzas Creek at Bennett Valley	Stream Stage, Precipitation	2018	Present	Continuous	
	Matanzas Reservoir	Lake Stage, Water Temperature, Precipitation	2018	Present	Continuous	
	Upper Copeland Creek	Stream Stage, Precipitation	2018	Present	Continuous	
	Mark West Creek at Porter Creek Road	Stream Stage, Precipitation	2018	Present	Continuous	

[a] Seasonal gages operate from October through April each water year

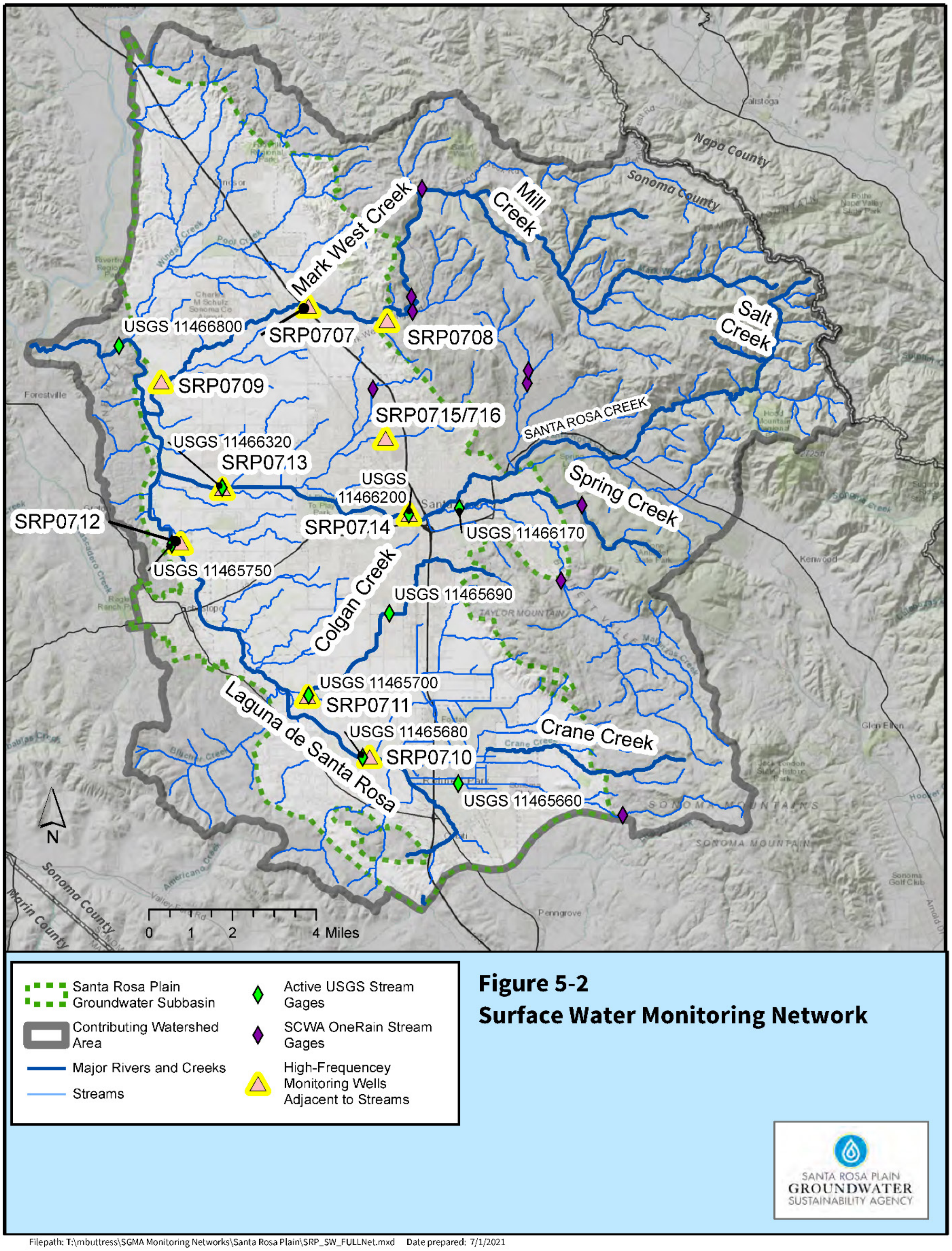


Figure 5-2. Surface Water Monitoring Network

In 2019, the GSA partnered with DWR's TSS program to install 10 shallow groundwater monitoring wells at 9 locations (one location has a cluster of two wells) adjacent to streams in the Subbasin to further the understanding of groundwater-surface water interaction. Five of these shallow monitoring wells were installed adjacent to active USGS gages (**Table 5-2; Figure 5-2)**. Details for the stream-adjacent shallow monitoring wells are shown in **Table 5-1a**.

5.2.4 Land Surface Elevation Monitoring Network

Available land surface elevation datasets for the Subbasin include measurements collected at one discrete GPS location since 2005 and InSAR satellite in most of the Subbasin since 2015. There are two additional GPS stations within the contributing watershed areas to the Subbasin. The GPS stations are monitored by the UNAVCO's PBO program and are identified as follows: P197, located on Highway 12 at Fulton Road; P196, located along Meacham Road south of Cotati; and P201, located on the ridgetop just north of Mark West Quarry.

5.3 Representative Monitoring Point Networks

As stated in the GSP Regulations, "Representative monitoring sites may be designated by an Agency as the point at which sustainability indicators are monitored, and for which quantitative values for minimum thresholds, measurable objectives, and interim milestones are defined" (23 CCR 354.36).

5.3.1 Representative Monitoring Point Network for Chronic Lowering of Groundwater Levels

The same data and reporting standards and guidance related to groundwater levels described for the Groundwater-level Monitoring Network for GSP Implementation in **Section 5.2.1** apply to the RMP Network for the Chronic Lowering of Groundwater Levels (Groundwater-level RMP Network). In addition, the following SGMA requirements and guidance from the GSP Regulations and DWR's BMPs for Monitoring Protocols, Standards and Sites and Monitoring Networks (DWR 2016b) and Identification of Data Gaps (DWR 2016c) apply to the selection of RMPs:

- "The designation of a representative monitoring site shall be supported by adequate evidence demonstrating that the site reflects general conditions in the area" (23 CCR 354.36).
- "If RMPs are used to represent groundwater elevations from a number of surrounding monitoring wells, the GSP should demonstrate that each RMP's historical measured groundwater elevations, groundwater elevation trends, and seasonal fluctuations are similar to the historical measurements in the surrounding monitoring wells" (DWR 2016b).

Rationale for Selection of RMP Network for Chronic Lowering of Groundwater Levels Sites

Potential groundwater-level RMPs were assessed using the same criteria used for the selection of GSP Implementation Network sites, as described in **Section 5.2.1**. These criteria include well type, well construction, well ownership, historical data record, and spatial coverage. In addition, the following criteria was used to assess potential groundwater-level RMPs:

- **Hydrograph Comparability:** Once potential RMPs were identified using the criteria listed above, groundwater-level hydrographs were plotted for the potential RMPs along with hydrographs for nearby wells with available data. Linear regression trend lines were plotted for spring groundwater levels. Potential RMPs were further evaluated by comparing overall trends and the magnitude of seasonal variations in groundwater levels with nearby wells to determine if the potential RMP could be considered representative of a given region. The comparative hydrographs for the potential RMPs and other nearby monitored wells are included in **Appendix 5-B** (**Figures 5-B-1** through **5-B-23**).

In some cases, newer wells (including new wells constructed specifically for SGMA compliance) with limited historical data records were selected as groundwater-level RMPs because they have favorable well type, well construction, well location, and/or well ownership attributes. For these wells, available historical data for nearby wells screened within the same aquifer system are plotted on the RMP comparative hydrographs (**Appendix 5-B**, **Figures 5-B-8**, **5-B-9**, **5-B-10**, **5-B-11**, **5-B-12**, and **5-B-17**) to help assess historical groundwater levels and trends in the vicinity of the newer RMP well.

Description of RMP Network for Chronic Lowering of Groundwater Levels

The Groundwater-level RMP Network for the shallow and deep aquifer systems is shown on **Figures 5-3a** and **5-3b**, respectively. This network consists of 14 wells screened within the shallow aquifer system and 12 wells screened primarily within the deep aquifer system. All of the RMP wells are located within the Subbasin. For the shallow aquifer system, 10 of the groundwater-level RMPs are dedicated monitoring wells (including municipal test wells) and 4 are private domestic wells. For the deep aquifer system, seven of the groundwater-level RMPs are dedicated monitoring wells (including municipal test wells), four are public supply wells, and one is a private domestic well. Details for wells in the Groundwater-level RMP Network including well construction, well use, and length of monitoring record are presented in **Tables 5-3a** and **5-3b.**

Monitoring frequencies for wells in the Groundwater-level RMP Network are shown in **Tables 5-3a** and **5-3b**. A total of 18 of the 26 Groundwater-level RMP wells are equipped with pressure transducers for subdaily water-level data collection, four of the RMP wells are monitored monthly, and the remaining four are monitored semiannually.

5.3.2 Representative Monitoring Point Network for Degraded Water Quality

All the public supply wells in the existing monitoring programs described in **Section 5.2.2** that have been sampled for COCs between 2015 and 2019 are initial RMPs for Degraded Water Quality (**Figure 5-4)**. This includes 104 wells sampled for arsenic, 122 wells sampled for nitrate, and 92 wells sampled for TDS.

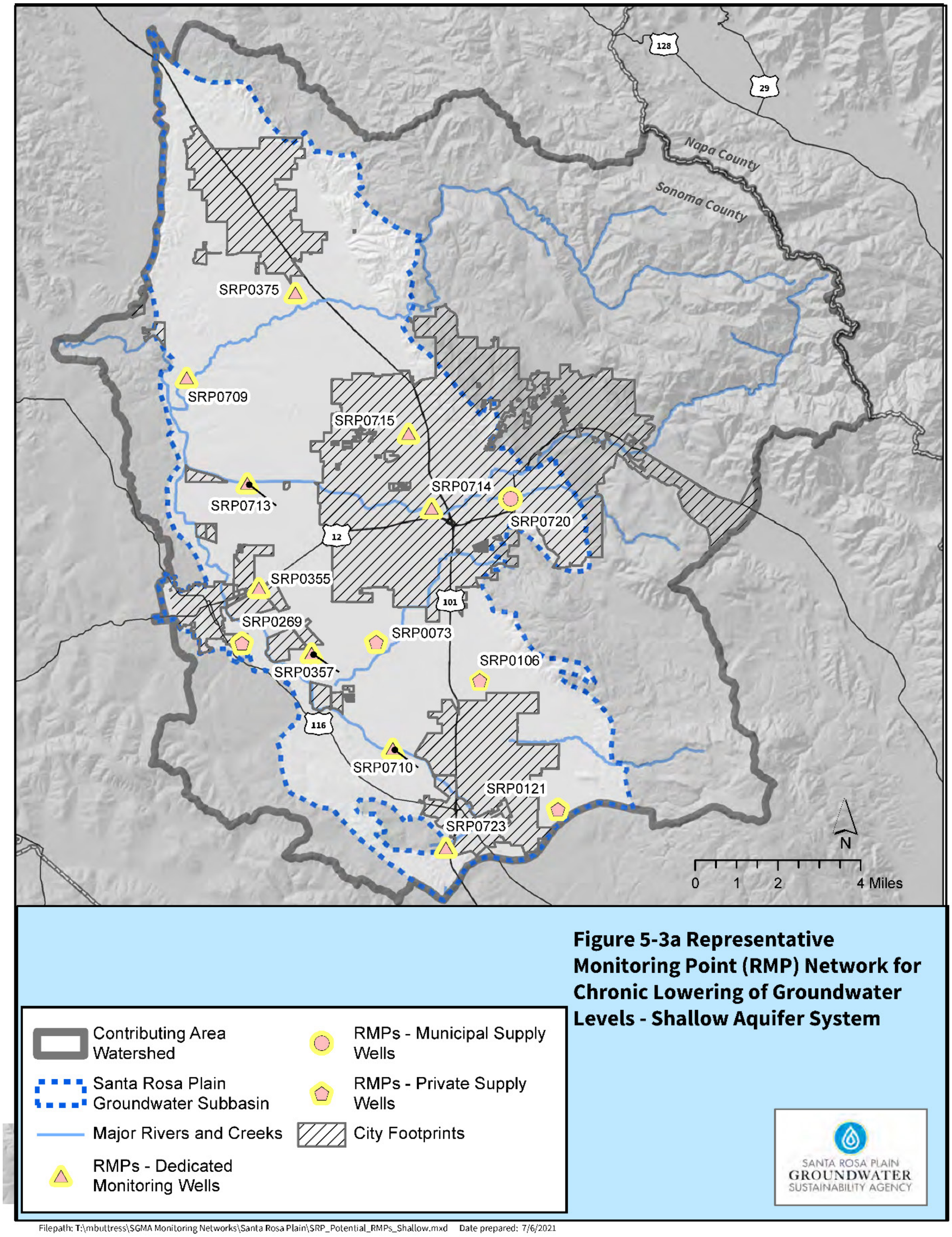


Figure 5-3a. Representative Monitoring Point Network for Chronic Lowering of Groundwater Levels – Shallow Aquifer System

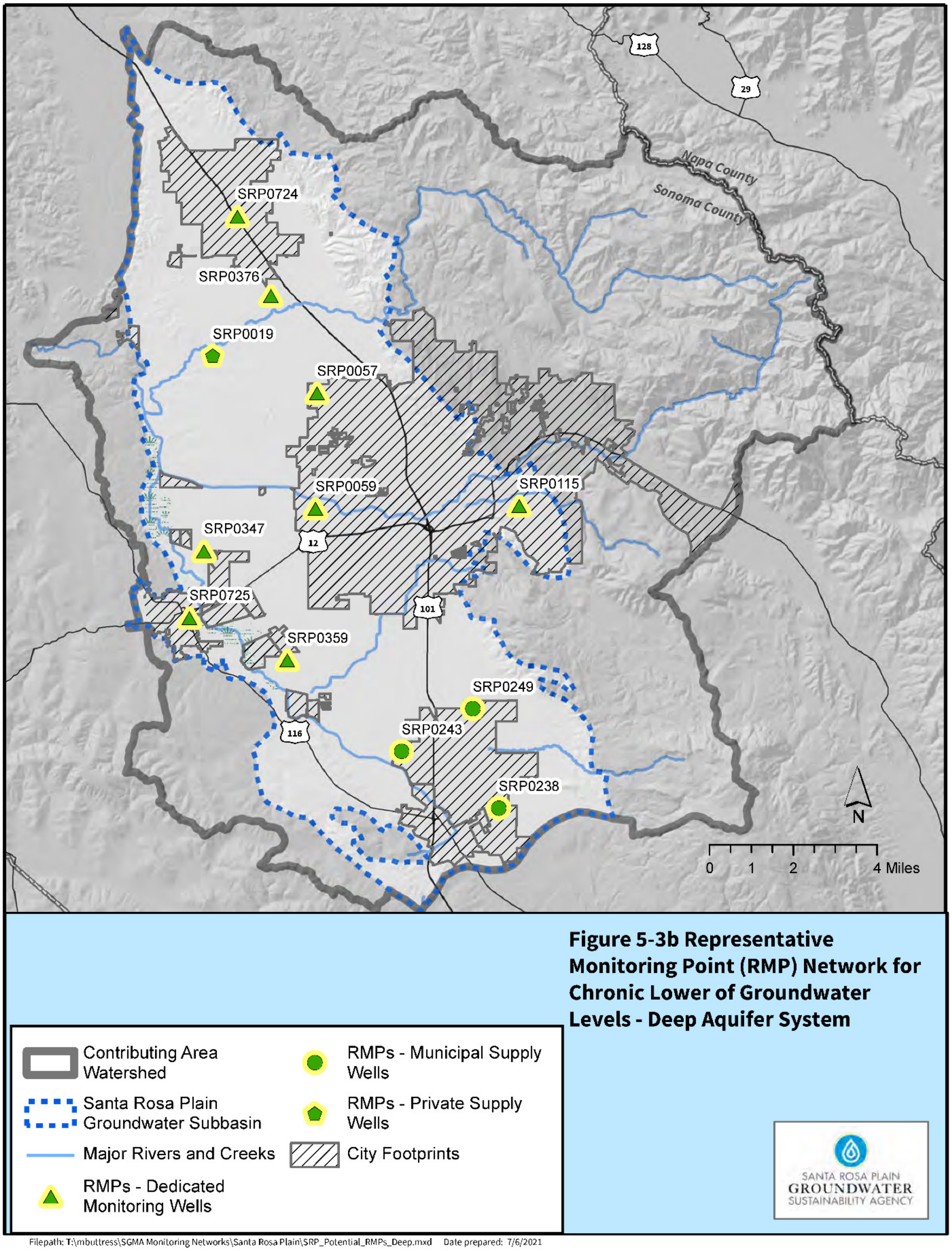


Figure 5-3b. Representative Monitoring Point Network for Chronic Lowering of Groundwater Levels – Deep Aquifer System

Table 5-3a. Representative Monitoring Point Network for Chronic Lowering of Groundwater Levels - Shallow Aquifer System

Data Management System ID	Data Management System ID					Data Record	Data Record		
Station Name	Station Number	Type of Well	Well Depth[a] (feet)	Screened Interval(s)[a] (feet)	Current Monitoring Frequency	From	Until	Additional Information	Well Owner
SRP0710	SRP-H18-02_Stony	Observation	45.5	35-45	Hourly	11/21/2019	Present	Laguna de Santa Rosa at Stony Point Road	Santa Rosa Plain Groundwater Sustainability Agency
SRP0709	SRP-C09-01_River Rd	Observation	33.5	23-33	Hourly	11/25/2019	Present	Mark West Creek at River Road	Santa Rosa Plain Groundwater Sustainability Agency
SRP0713	SRP-D11-02_Willow	Observation	45.5	25-45	Hourly	11/25/2019	Present	Santa Rosa Creek at Willowside Road	Santa Rosa Plain Groundwater Sustainability Agency
SRP0714	SRP-H12-01_Pierson	Observation	51.5	41-51	Hourly	11/25/2019	Present	Santa Rosa Creek at Pierson St.	Santa Rosa Plain Groundwater Sustainability Agency
SRP0715	SRP-H10-04_Hardies	Observation	40.5	30-40	Hourly	11/25/2019	Present	Paulin Creek at Hardies Ln.	Santa Rosa Plain Groundwater Sustainability Agency
SRP0355	SCWA_SEB_MW_07	Observation	90	70-90	Hourly	2/14/2008	Present		Sonoma County Water Agency
SRP0357	SCWA_TODD_RED	Observation	80	60-80	Hourly	6/1/1977	Present		Sonoma County Water Agency
SRP0375	SCWA_Airport_MW_02	Observation	140	120-140	Hourly	4/29/2011	Present	385117N1227863W001, SRP-E07-02	Sonoma County Water Agency
SRP0720	Hoen Well	Observation	115	?	Monthly	4/1/2005	11/8/2019		City of Santa Rosa
SRP0723	MW-114	Observation	?	?	Semiannually	5/30/2007	10/10/2019		City of Santa Rosa
SRP0073	SRP-G15-01	Unknown	80	?	Semiannually	11/3/1989	3/21/2017	06N08W04Q001M	Private
SRP0106	SRP-J16-01	Unknown	90	?	Monthly	10/3/1989	2/9/2021	06N08W12M001M	Private
SRP0121	SRP-L19-01	Unknown	150	?	Monthly	11/9/1989	2/13/2020	06N07W30R001M	Private
SRP0269	WGFH-08	Unknown	160	100-160	Semiannually	5/23/2009	10/13/2019	383889N1228088W001	Private

[a] Well depth and screened interval(s) reported in feet below top-of-casing

Table 5-3b. Representative Monitoring Point Network for Chronic Lowering of Groundwater Levels - Deep Aquifer System

Data Management System ID	Data Management System ID					Data Record			
Station Name	**Station Number**	**Type of Well**	**Well Depth[a] (feet)**	**Screened Interval(s)[a] (feet)**	**Monitoring Frequency**	**From**	**Until**	**Additional Information**	**Well Owner**
SRP0359	SCWA_TODD_WHITE	Observation	257	237-257	Hourly	8/2/1979	Present		Sonoma County Water Agency
SRP0347	SCWA_OCC_MW_04	Observation	740	660-740	Hourly	6/28/2010	Present		Sonoma County Water Agency
SRP0376	SCWA_Airport_MW_03	Observation	360	340-360	Hourly	4/25/2011	Present	CASGEM ID: 385117N1227863W002, SRP-E07-03	Sonoma County Water Agency
SRP0115	SRP-K12-04	Observation	870	500-860	Sub-Daily	4/22/2010	Present	MARTHA WAY	City of Santa Rosa
SRP0057	SRP-F09-02	Observation	360	200-350	Sub-Daily	5/20/2011	Present	NORTHWEST VILLAGE	City of Santa Rosa
SRP0059	SRP-F12-01	Observation	694	199-684	Sub-Daily	5/20/2011	Present	PLACE TO PLAY	City of Santa Rosa
SRP0238	SRP-K19-01	Municipal	380	130-380	Sub-Daily	11/1/1991	Present	CASGEM ID: 383350N1226841W001, RP Well 37	City of Rohnert Park
SRP0249	SRP-J17-01	Municipal	462	302-462	Sub-Daily	9/1/1980	Present	CASGEM ID: 383694N1226960W001, RP Well 17	City of Rohnert Park
SRP0243	SRP-H18-01	Municipal	582	258-582	Sub-Daily	3/1/1982	Present	CASGEM ID: 383544N1227271W001, RP Well 24	City of Rohnert Park
SRP0724	Windsor_Bluebird	Observation	765	695-745	Semiannually	6/16/2020	3/22/2021	BLUEBIRD WELL	Town of Windsor
SRP0725	Sebastopol Well #5	Municipal	528	138-528	Sub-Daily	2/1/2007	Present		City of Sebastopol
SRP0019	SRP-D08-02	Unknown	1048	?	Monthly	3/16/1976	2/5/2020	08N09W36P001M	Private

[a] Well depth and screened interval(s) reported in feet below top-of-casing

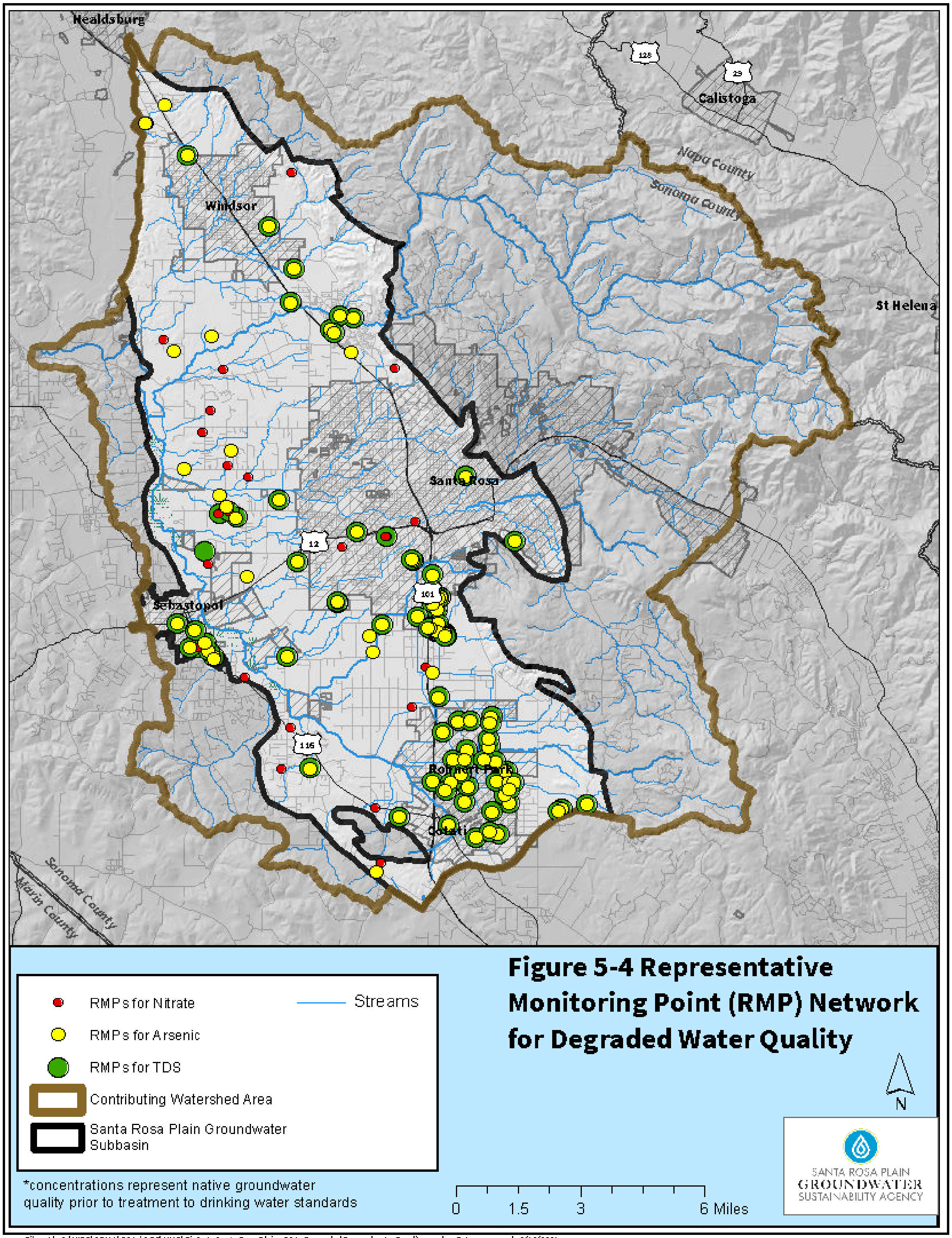


Figure 5-4. Representative Monitoring Point Network for Degraded Water Quality

5.3.3 Representative Monitoring Point Network for Depletion of Interconnected Surface Water

The 10 dedicated stream-adjacent groundwater monitoring wells were evaluated as potential RMPs for depletion of interconnected surface water (**Figure 5-2)**. The monitoring wells were surveyed and instrumented with pressure transducers for collection of hourly groundwater-level and temperature data. After the first year of data collection (WY 2020), the groundwater-level data were compared with streambed elevation data at each location to assess groundwater-surface water interconnection. Hydrographs showing groundwater-level data for the shallow stream-adjacent monitoring wells alongside streambed elevation data and stream stage data, where available, are presented in **Appendix 4-D**. Based on the assessment of interconnection, 7 of the 10 shallow stream-adjacent monitoring wells were initially selected as RMPs for depletion of interconnected surface water. The RMPs include one well adjacent to the Laguna de Santa Rosa, two wells adjacent to Mark West Creek (one near the confluence with the Laguna de Santa Rosa), two locations adjacent to Santa Rosa Creek, one location adjacent to Paulin Creek, and one location adjacent to Colgan Creek (near the confluence with the Laguna de Santa Rosa) (**Figure 5-5**). Details of the RMPs, including well construction and monitoring frequency, are presented in **Table 5-4**.

5.3.4 Representative Monitoring Point Network for Land Subsidence

As described in **Section 4.9**, each 100-square-meter InSAR pixel is considered an RMP for land subsidence. The InSAR dataset covers virtually the entire Subbasin with no significant data gaps (**Figure 3-14e**).

5.4 Assessment and Improvement of Monitoring Networks

The GSP Regulations require a plan to include a review and evaluation of each monitoring network. As stated in the Regulations, “Each Agency shall identify data gaps wherever the basin does not contain a sufficient number of monitoring sites, does not monitor sites at a sufficient frequency, or uses monitoring sites that are unreliable, including those that do not satisfy minimum standards of the monitoring network adopted by the Agency” (23 CCR 354.38).

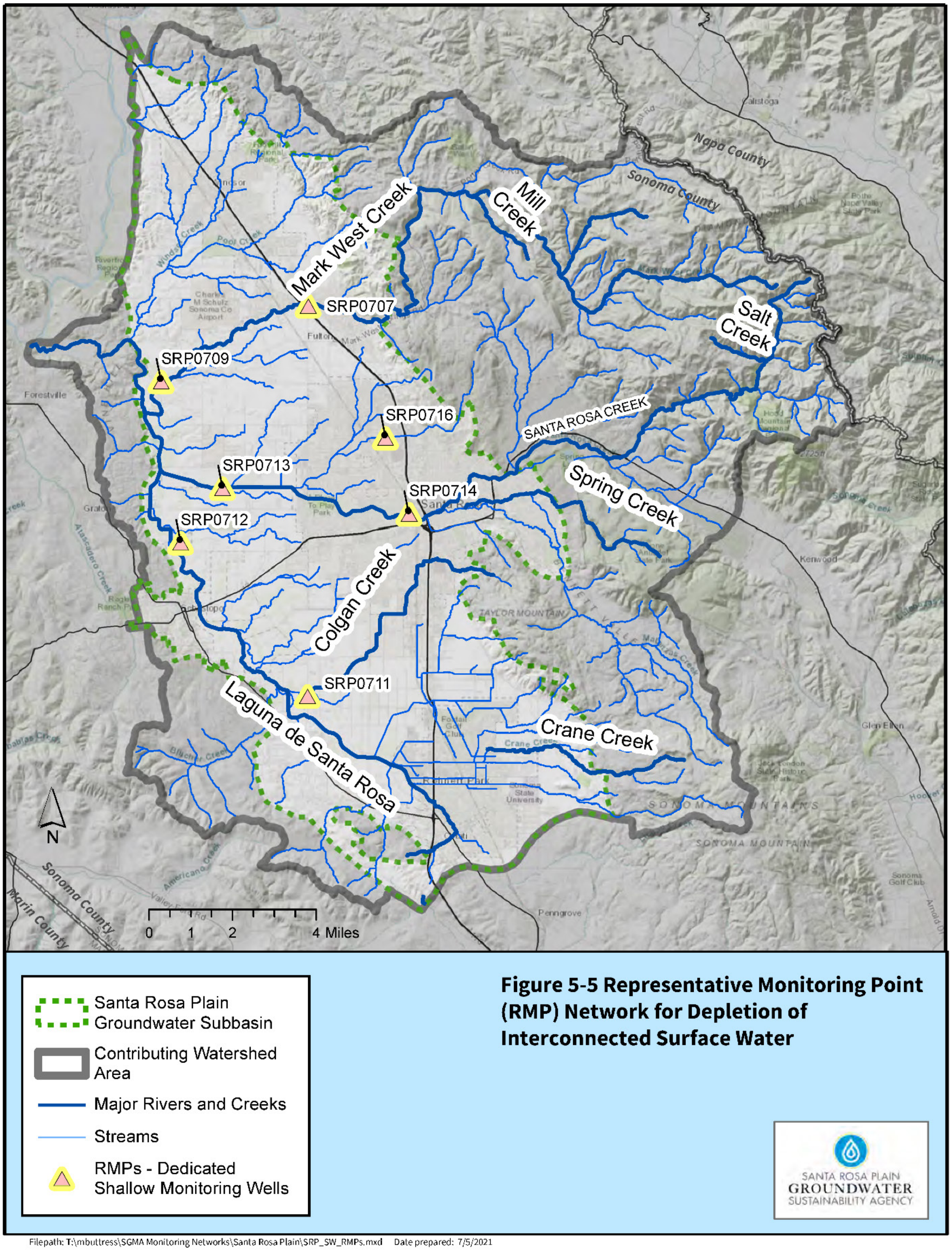


Figure 5-5. Representative Monitoring Point Network for Depletion of Interconnected Surface Water

Table 5-4. Representative Monitoring Point Network for Depletion of Interconnected Surface Water

Data Management System ID	Data Management System ID					Data Record	Data Record		
Station Name	Station Number	Type of Well	Well Depth[a] (feet)	Well Depth Category	Screened Interval(s)[a] (feet)	Data From	Data Until	Monitoring Frequency	Additional ID Information
SRP0707	SRP-F07-04_Fulton	Observation	50.5	Shallow (0-200 feet)	30-50	11/21/2019	Present	Sub-Daily	Mark West Creek at Fulton Road
SRP0709	SRP-C09-01_River Rd	Observation	33.5	Shallow (0-200 feet)	23-33	11/25/2019	Present	Sub-Daily	Mark West Creek at River Road
SRP0711	SRP-F16-01_Llano	Observation	45.5	Shallow (0-200 feet)	35-45	11/25/2019	Present	Sub-Daily	Colgan Creek at Llano Road
SRP0712	SRP-C13-03_Sanford	Observation	48.5	Shallow (0-200 feet)	28-48	11/25/2019	Present	Sub-Daily	Laguna de Santa Rosa at Occidental Road
SRP0713	SRP-D11-02_Willow	Observation	45.5	Shallow (0-200 feet)	25-45	11/25/2019	Present	Sub-Daily	Santa Rosa Creek at Willowside Road
SRP0714	SRP-H12-01_Pierson	Observation	51.5	Shallow (0-200 feet)	41-51	11/25/2019	Present	Sub-Daily	Santa Rosa Creek at Pierson Street
SRP0716	SRP-H10-04s_Hardies	Observation	20.5	Shallow (0-200 feet)	15-20	11/25/2019	Present	Sub-Daily	Paulin Creek at Hardies Lane - Shallow

[a] Well depth and screened interval(s) reported in feet below top-of-casing

5.4.1 Assessment and Identification of Data Gaps – Groundwater-level Monitoring Network

With 61 monitored wells in the shallow aquifer system and 35 monitored wells in the deep aquifer system, the Groundwater-level Monitoring Network for GSP Implementation contains sufficient monitoring sites to meet the monitoring objectives for the Subbasin. The following subsections describe the process and results of assessing spatial and temporal data gaps within both principal aquifer systems, as well as an assessment of data quality.

5.4.1.1 Spatial Distribution Data Gap Assessment

A preliminary assessment of spatial coverage data gaps in the GSP Implementation Network is presented on **Figures 5-6a** and **5-6b** for the shallow and deep aquifer systems, respectively. This assessment was conducted during the GSP preparation process and used to inform monitoring network improvement projects, particularly the installation of up to four multilevel monitoring wells under a Proposition 68 grant planned for 2022.

The initial assessment for the shallow aquifer system identified data gaps in the northern tip of the Subbasin near the Town of Windsor and in the southwestern corner of the Subbasin, west of the Sebastopol Fault (**Figure 5-6a**). Additionally, the need for a multi-depth monitoring well along the southern boundary of the Subbasin was identified to improve the understanding of subsurface interaction with the adjacent Petaluma Valley Groundwater Basin. The shallow aquifer system Groundwater-level Monitoring Network for GSP Implementation was compared with the well density map presented in the Description of Plan Area section (**Figure 2-6**). This comparison indicated that all areas within the Subbasin with relatively high densities of water supply wells have shallow monitoring sites within a reasonably close vicinity, with the exception of the southwestern corner data gap area. Monitoring well sites have been identified in the northern tip and southern boundary data gap areas, and multilevel monitoring wells have been designed and will be installed when funding allows. A suitable location for a dedicated monitoring well has not been identified in the southwestern corner data gap area. The GSA will attempt to incorporate additional existing wells into the monitoring network in this area. Several previously identified data gaps in the shallow aquifer system Groundwater-level Monitoring Network were addressed through the installation of 10 shallow monitoring wells completed through DWR's TSS program in 2019.

The initial assessment for the deep aquifer system identified data gaps in the northern tip of the Subbasin near the Town of Windsor, in the northwestern portion of the Subbasin southwest of the Town of Windsor, along the western edge of the Subbasin north of the City of Sebastopol, in the eastern-central portion of the Subbasin near southwestern Santa Rosa, and in the southwestern corner of the Subbasin, west of the Sebastopol Fault (**Figure 5-6b**). Although several City of Rohnert Park municipal supply wells included in the deep aquifer system Groundwater-level Monitoring Network provide coverage in the southern portion of the Subbasin, it was determined that an additional dedicated monitoring well is needed to monitor groundwater conditions near the southern boundary of the Subbasin with the Petaluma Valley

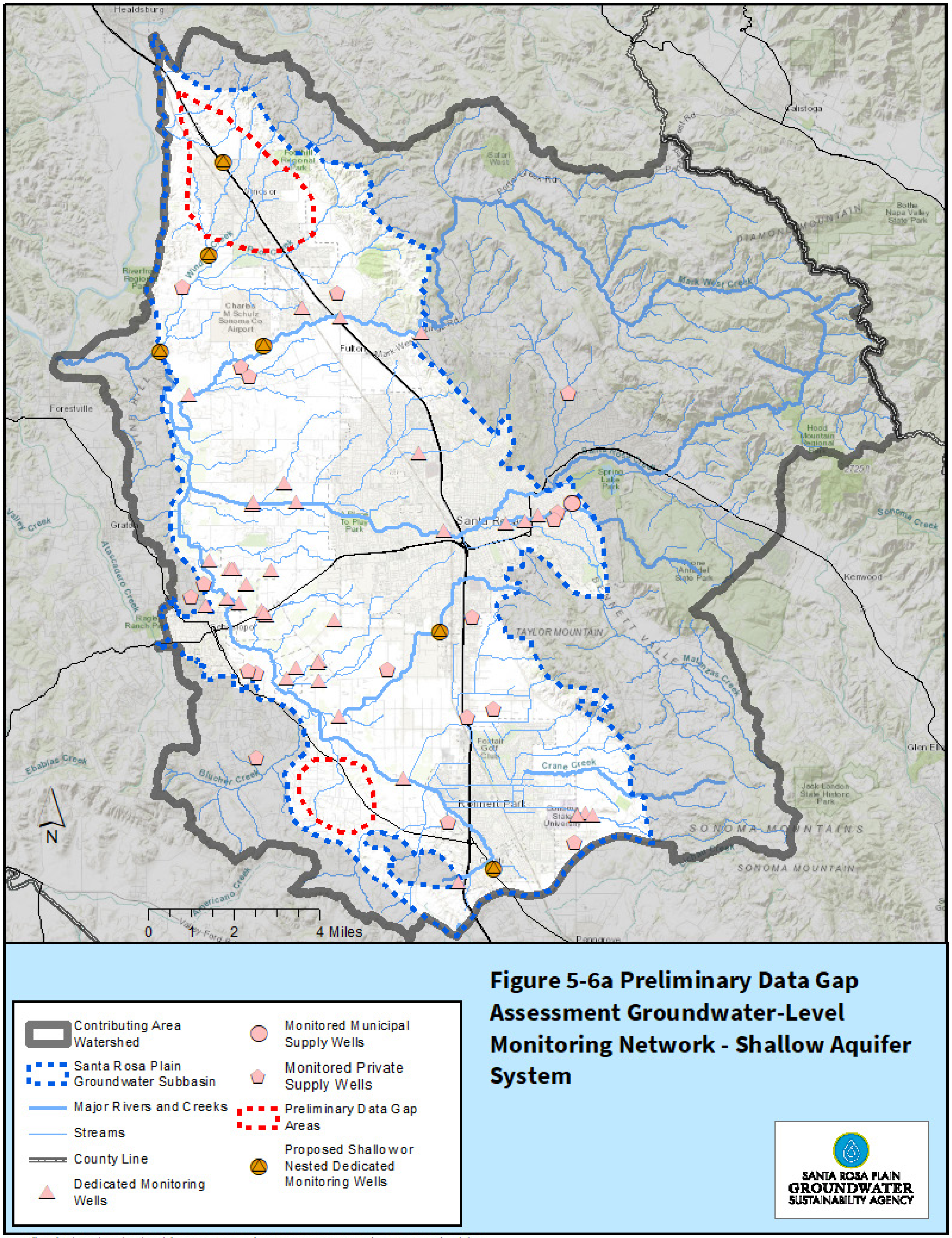


Figure 5-6a. Preliminary Data Gap Assessment Groundwater-level Monitoring Network – Shallow Aquifer System

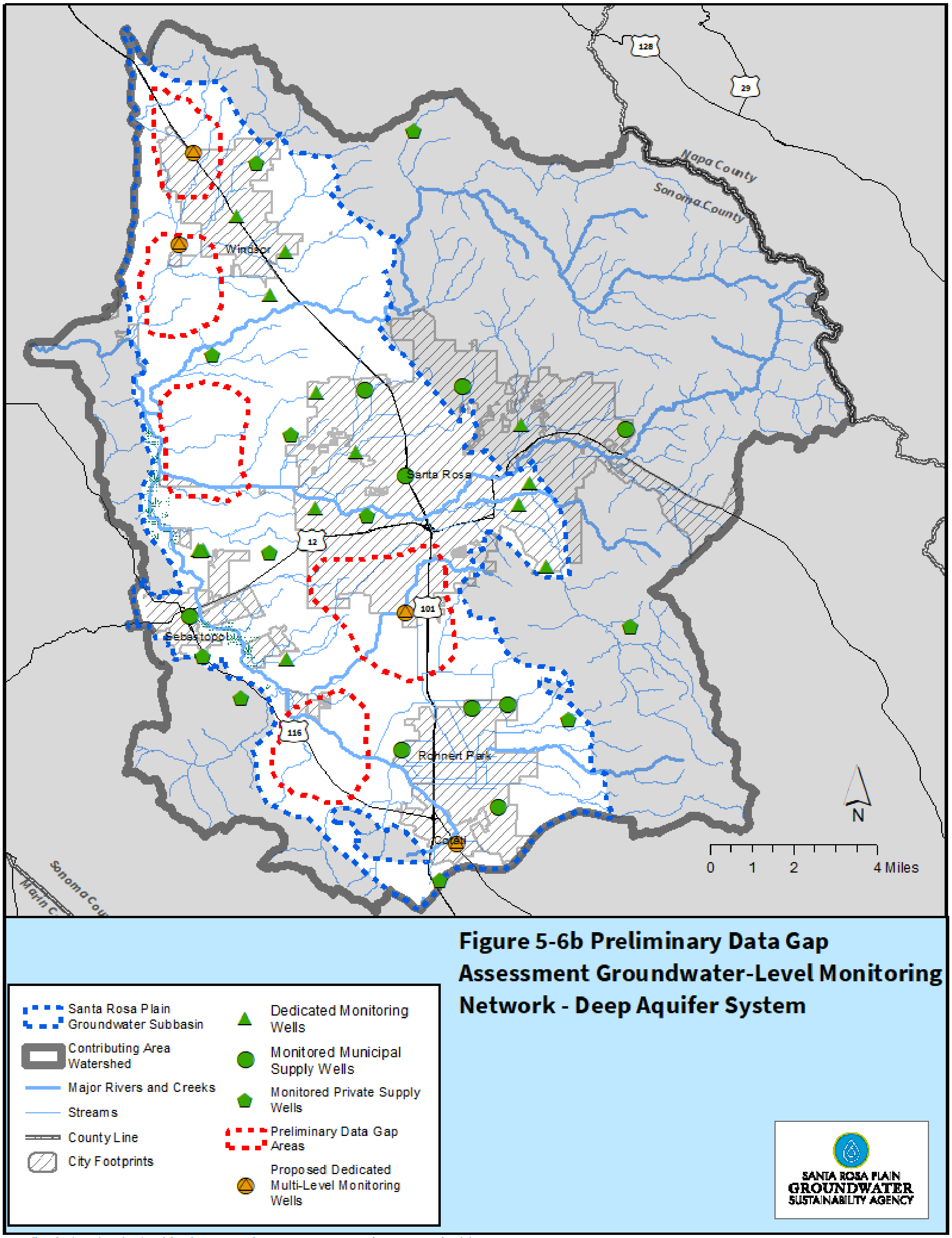


Figure 5-6b. Preliminary Data Gap Assessment Groundwater-level Monitoring Network – Deep Aquifer System

Groundwater Basin. The deep aquifer system GSP Implementation Network was compared with the well density map presented in the Description of Plan Area section (**Figure 2-6**). This comparison indicated that all areas within the Subbasin with relatively high densities of water supply wells have deep monitoring sites within a reasonably close vicinity with the exception of the southwestern corner and eastern-central data gap areas and, to a lesser extent, the northwestern and western edge data gap areas. The northwestern and eastern-central data gap areas will be addressed through the installation of Proposition 68-funded multilevel monitoring wells planned for 2022. Monitoring well sites have been identified in the northern tip and southern boundary data gap areas, and multilevel monitoring wells have been designed and will be installed when funding allows. For the remaining data gap areas along the western edge of the Subbasin north of the City of Sebastopol and in the southwestern corner of the Subbasin, the GSA will look for opportunities to incorporate existing wells into the monitoring network. The GSA intends to conduct outreach and expand the voluntary Groundwater-level Monitoring Program in the Subbasin during GSP implementation.

Figure 5-6c presents the identified spatial data gaps in the Boundary Network. The majority of the monitored wells in the Boundary Network (8 out of 16 wells) are in the Wilson Grove Formation Highlands Groundwater Basin to the west of the Subbasin. This is appropriate as much of the Wilson Grove Formation Highlands Basin is classified as a major natural recharge area (**Figure 2-9**) providing subsurface inflow to the Santa Rosa Plain Subbasin. The monitored wells in the Wilson Grove Formation Highlands basin range in total depth from 61 feet to 260 feet with four shallow wells (less than 200 feet deep), three deep wells (greater than 200 feet deep), and one well with unknown construction details. This network is sufficient for monitoring groundwater-level trends in the eastern portion of the Wilson Grove Formation Highlands Basin that could affect subsurface inflow to the Santa Rosa Plain Subbasin. Two data gap areas are shown in the Wilson Grove Formation Highlands Basin (**Figure 5-6c)** (adjacent to the southwestern corner of the Subbasin and to the west of the City of Sebastopol). Because well SRP0245's construction details are unknown and the surrounding area has a relatively high density of water supply wells (**Figure 2-6**), the GSA will attempt to incorporate additional existing wells into the Boundary Network in these areas. The remaining eight monitored wells in the Boundary Network are in the Healdsburg Area Subbasin, the Alexander Area Subbasin, the Rincon Valley Subbasin, the Petaluma Valley Basin, and areas outside of the defined basins but within the contributing watershed areas to the Santa Rosa Plain Subbasin. Additional Boundary Network data gap areas are identified in the Healdsburg Area Subbasin and the northern portion of the Petaluma Valley Basin (**Figure 5-6c**). The GSA will attempt to identify existing wells to incorporate into the Boundary Network in the Healdsburg Area Subbasin. Installation of a multilevel dedicated monitoring well is planned for 2022 in the northern Petaluma data gap area.

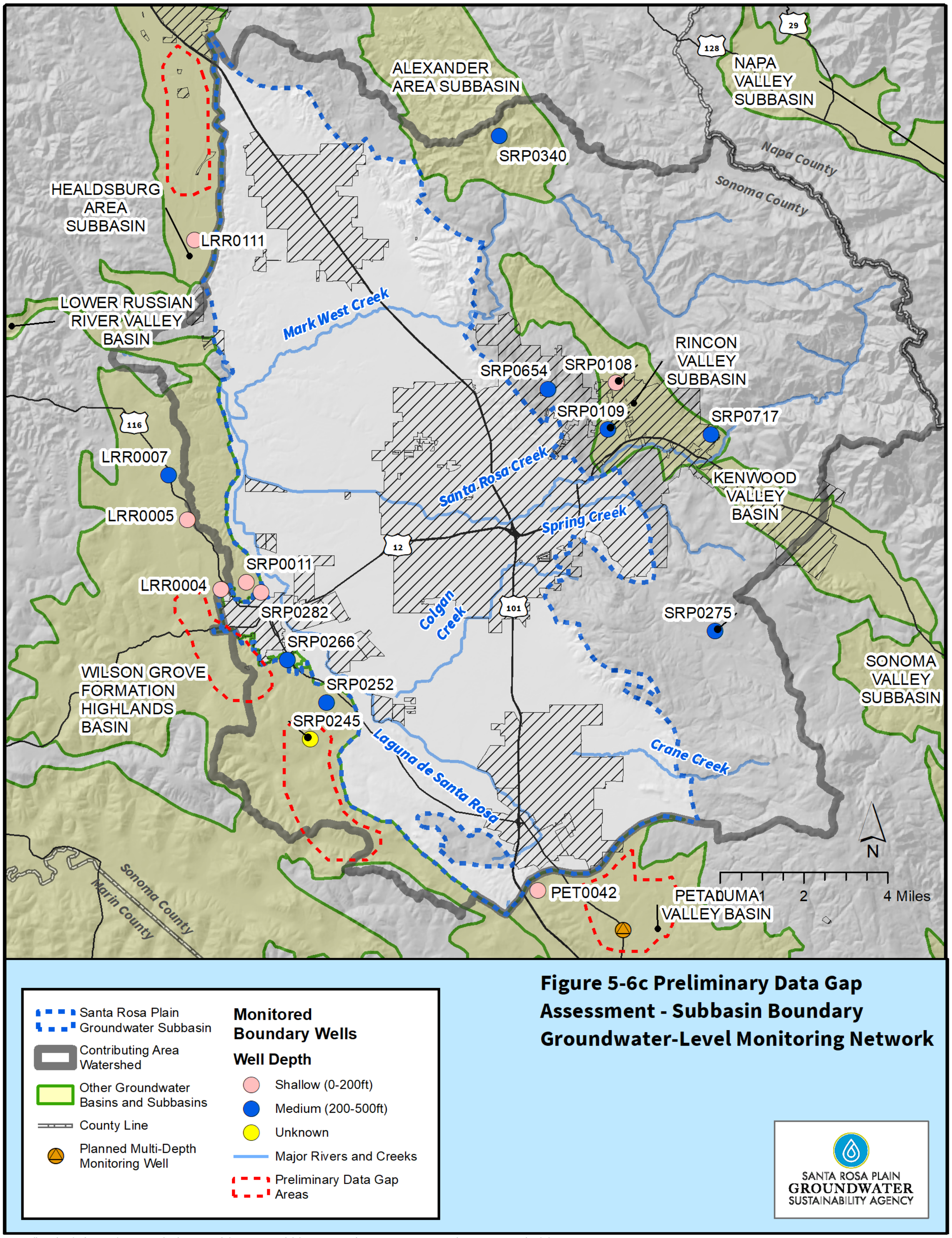


Figure 5-6c. Preliminary Data Gap Assessment – Subbasin Boundary Groundwater-level Monitoring Network

5.4.1.2 Monitoring Frequency Data Gap Assessment

Water-level data is collected at least daily (typically hourly) using pressure transducers from 43 (high-frequency monitoring wells) of the 96 wells in the GSP Implementation Network. Manual water-level measurements are collected at least semiannually for all wells in the network. Included in the High-Frequency Monitoring Wells are 10 shallow monitoring wells installed adjacent to streams and major creeks in 2019 with the intended purpose of monitoring shallow groundwater levels relative to nearby surface water levels. A total of 18 of the 26 wells in the RMP network for chronic lowering of groundwater levels are equipped with pressure transducers for subdaily water-level data collection. Four of the RMP wells are monitored monthly and the remaining four are monitored semiannually. The monitoring frequencies described above are sufficient to meet the monitoring objectives for the Subbasin. Increased monitoring frequencies are recommended for the four RMP wells that are currently monitored semiannually (SRP0073, SRP0269, SRP0723, and SRP0724). The GSA will contact well owners to request permission to increase monitoring frequency to quarterly or monthly. The GSA will explore the possibility of installing remote monitoring equipment such as pressure transducers for subdaily data collection in the eight RMP wells that are not currently high-frequency monitoring wells, dependent on funding availability, well owner willingness, and well compatibility.

5.4.1.3 Data Quality Assessment

An initial assessment of data gaps related to the ability of groundwater-level monitoring sites to satisfy applicable SGMA standards was conducted during GSP preparation. This subsection presents the initial assessment of data quality and identifies data gaps to be addressed during the GSP implementation phase. Specific SGMA standards or guidance for which data gaps were identified are as follows:

- "Reference point elevations shall be measured and reported in feet to an accuracy of at least 0.5 feet, or the best available information, relative to NAVD88 [North American Vertical Datum of 1988], or another national standard that is convertible to NAVD88, and the method of measurement described" (23 CCR 352.4).
- For wells used to monitor groundwater conditions, the GSA will provide the following information: casing perforations, borehole depth, and total well depth.
- Wells that are part of the monitoring program should be dedicated groundwater monitoring wells with known construction information. The selection of wells should be aquifer specific and wells that are screened across more than one aquifer should be avoided where possible.

The initial assessment of the groundwater-level monitoring networks indicated the following:

- Forty-one of the 96 wells in the Groundwater-level Monitoring Network for GSP Implementation lack sufficient reference point vertical survey data (that is, top-of-casing elevation). This includes 9 of the 26 wells in the RMP network for chronic lowering of groundwater levels.

- Thirty-nine of the 96 wells in the Groundwater-level Monitoring Network for GSP Implementation lack complete construction information (that is, missing screened intervals and/or total depth information). This includes 7 of the 26 wells in the RMP network for chronic lowering of groundwater levels.
- Eight of the 35 wells in the deep aquifer system Groundwater-level Monitoring Network for GSP Implementation have screened intervals that extend into the shallow aquifer system. This includes 2 of the 12 deep aquifer system wells in the RMP network for chronic lowering of groundwater levels.

The GSA will work to improve data quality in groundwater-level monitoring networks by a combination of the following activities:

- Performing survey activities for wells that lack sufficient reference point vertical survey data, as funding becomes available
- Obtaining well construction information from well owners or by conducting investigations (for example, video logging) as funding or technical assistance becomes available
- Replacing wells in the monitoring network that have data quality issues with dedicated monitoring wells, as funding becomes available

5.4.2 Assessment and Identification of Data Gaps – Surface Water Monitoring Network

The nine active USGS stream gages and nine OneRain gages operated by Sonoma Water provide a robust, well-distributed surface water monitoring network in the Subbasin and contributing watershed areas. Ten stream-adjacent shallow groundwater monitoring wells, combined with the surface water monitoring network, monitor groundwater-surface water interaction throughout the Subbasin. Data gaps in the understanding of interconnected surface water in the Subbasin are illustrated on **Figure 5-7**. Additional stream-adjacent shallow groundwater monitoring wells are needed adjacent to the active USGS stream gages on Mark West Creek near Mirabel Heights and Colgan Creek near Santa Rosa. The GSA is planning to work with DWR’s TSS program to install a shallow monitoring well near Mark West Creek near the Mirabel Heights gage and is planning to install a multilevel monitoring well (including a shallow stream-adjacent well) near Colgan Creek near the Santa Rosa gage in 2022 using Proposition 68 grant funds. Another data gap area is along Windsor Creek in the northern portion of the Subbasin (**Figure 5-7)**. A multilevel groundwater monitoring well is planned for installation adjacent to Windsor Creek using Proposition 68 grant funds in 2022. The GSA also plans to install a stilling well with a pressure transducer at this location for comparing shallow groundwater-level and surface water elevations. Lastly, the GSA plans to install a stilling well and pressure transducer on Mark West Creek at Fulton Road adjacent to monitoring well SRP0707 for comparison of shallow groundwater-level and surface water elevations.

Figure 5-8 illustrates the shallow aquifer groundwater-level and surface water monitoring network, data gaps and mapped groundwater dependent ecosystems, as described in **Section 3.2.6.3**.

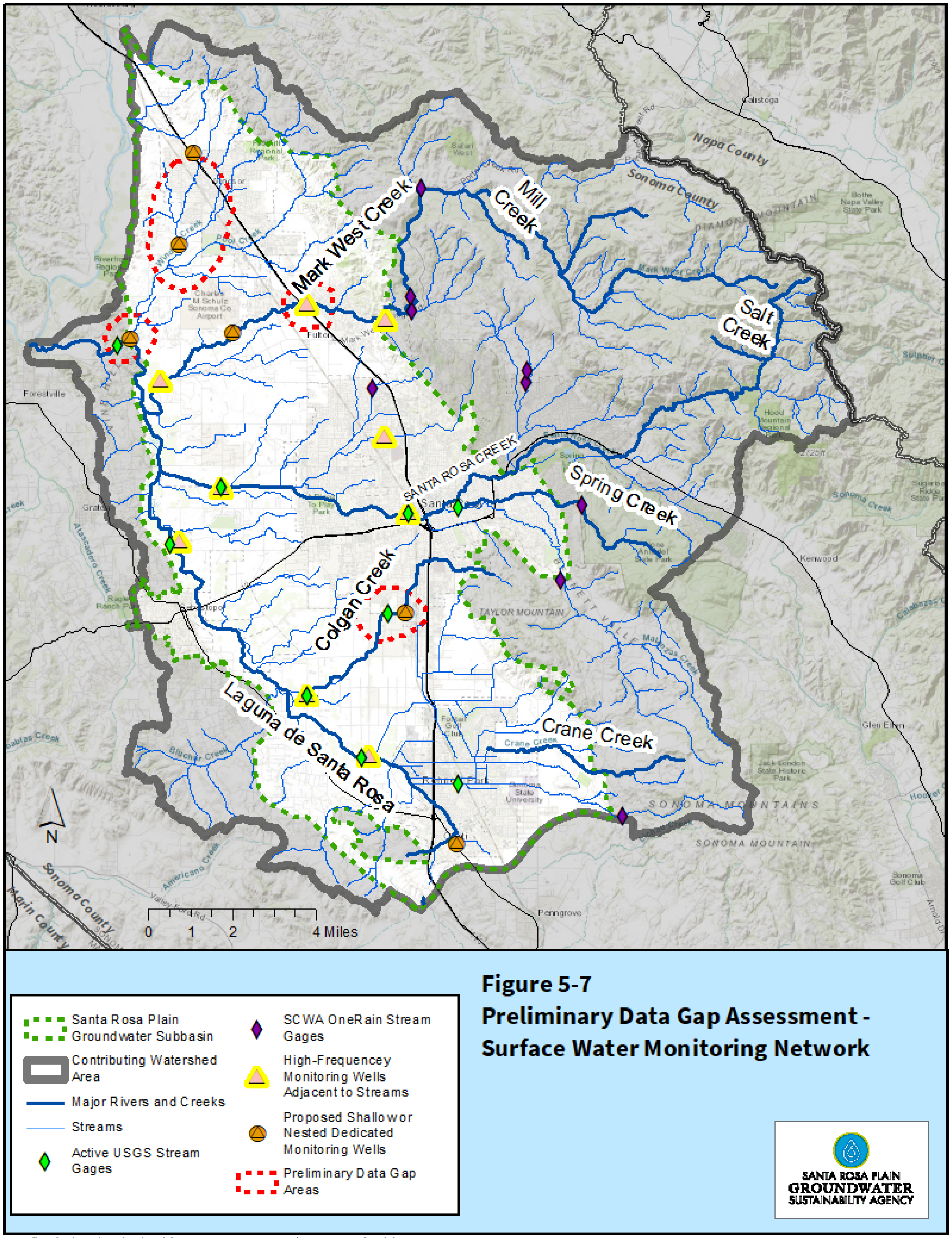


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Figure 5-7. Preliminary Data Gap Assessment – Surface Water Monitoring Network

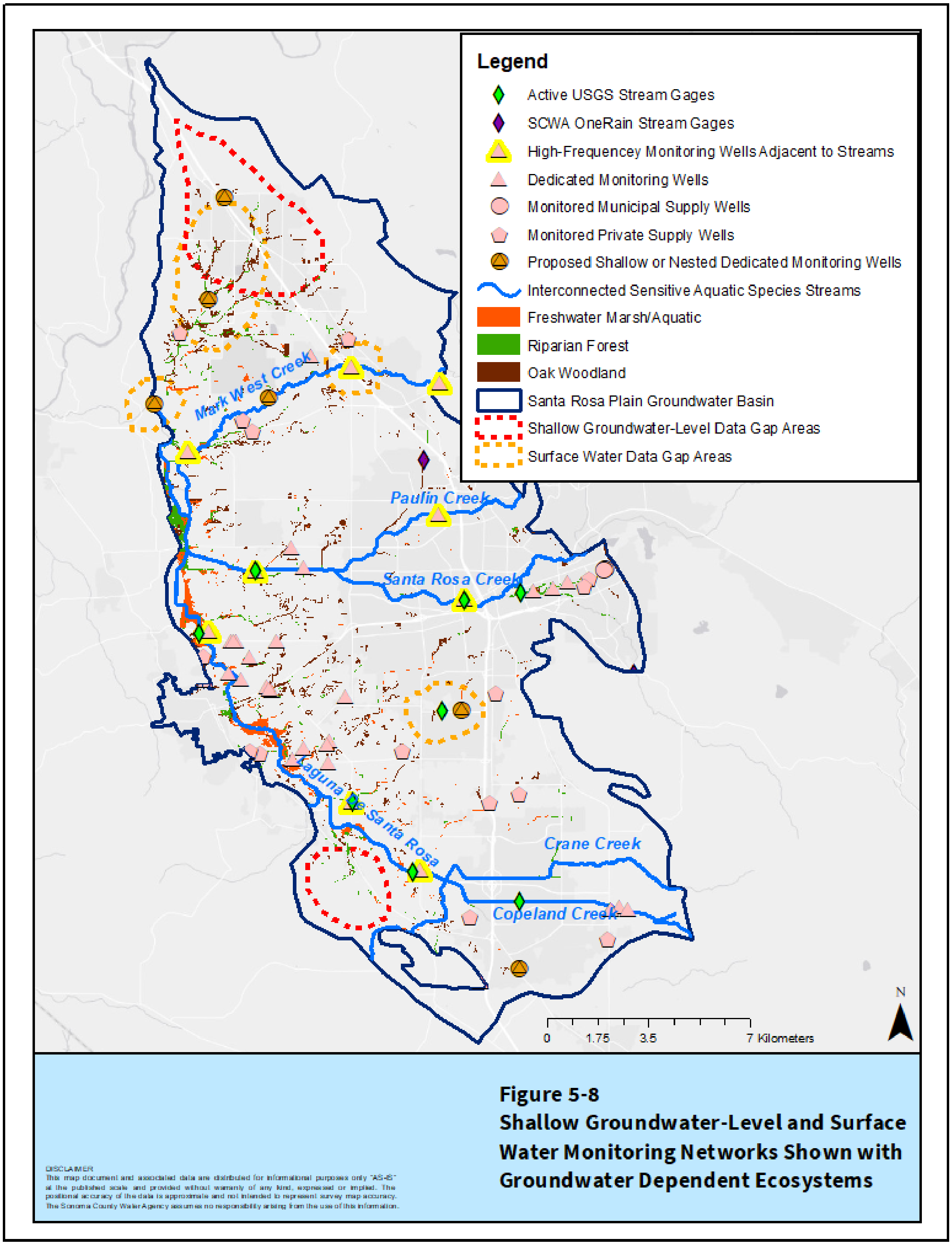

Figure 5-8. Shallow Groundwater-level and Surface Water Monitoring Networks and Groundwater Dependent Ecosystems

Section 6: Projects and Management Actions

Groundwater Sustainability Plan

Santa Rosa Plain Groundwater Subbasin

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Appendices

6 PROJECTS AND MANAGEMENT ACTIONS

This section satisfies Sections 354.42 and 354.44 of the SGMA regulations, which require that GSPs include descriptions of projects and possible management actions that the GSA has determined will help achieve the sustainability goal as well as to respond to changing conditions in the basin over the 50-year planning horizon. Additionally, the GSP is required to include:

1. Which MO will benefit from a specific project or management action
2. Criteria and circumstances that would trigger implementation and future termination
3. The process by which the GSA will determine a project or management action is necessary to execute

Projects and management actions can be used to attain the MOs, meet interim milestones, and avoid MT exceedances and undesirable results.

The management actions and projects covered in this chapter outline a framework for achieving sustainability; however, many details must be negotiated before many of the projects and management actions can be implemented. The costs for management actions and project implementation are additional to the funding required to sustain the operation of the GSA, and the funding needed for monitoring and reporting. The collection of projects and management actions discussed in this section demonstrate that sufficient options exist to reach and maintain sustainability. Not all projects and actions have to be implemented to attain sustainability. Therefore, the projects and management actions included herein should be considered a list of options that will be refined during GSP implementation.

6.1 Identification of Projects and Management Actions

The identification of projects and management actions was an iterative process which included significant Advisory Committee and GSA Board input, and a substantial amount of staff work. Input received from the Advisory Committee and GSA Board helped refine and categorize the selection of projects and management actions into those that could be initially evaluated as part of this GSP, and those that require further assessment or study prior to implementation. For example, based on limitations and uncertainty related to the potential for future expansion of recycled water supplies, additional expansion of recycled water deliveries for irrigation supplies is not included with the projects evaluated using scenario modeling described in **Section 6.3**. Future opportunities for expansion and optimization of recycled water supplies with recycled water purveyors within the Subbasin will be evaluated as a management action during the first 5 years of GSP implementation. Additionally, other ideas for projects and actions raised by Advisory Committee and community members would need to be further developed and planned to evaluate with model scenarios. For example, recharge net-metering programs, water markets, and net-zero water use requirements for new development need further refinement. Management actions the GSA has under its authority, such as mandatory conservation or pumping reductions, will also be studied and considered during the first 5 years of GSP implementation, as described in **Section 6.4**.

The projects and management actions considered for implementation and further planning build upon the successful historical groundwater management activities conducted within the Subbasin are listed below:

- Use of imported surface water by various municipalities (Sonoma Water's water contractors) in lieu of local groundwater supplies
- Development and use of recycled water supplies for meeting agricultural and landscape irrigation demands
- Implementation of water-use efficiency and conservation programs within the urban water-use sector
- Studies and implementation of water-use efficiency measures within the agricultural sector
- Studies and initial planning for managed aquifer recharge, including:
    - Feasibility study and initial planning for ASR
    - Studies, data collection, and pilot testing for stormwater recharge projects

While some of these initiatives and activities have historically been developed and planned specifically to address groundwater conditions within the Subbasin, many have been developed and implemented to achieve other benefits, objectives, and purposes. Inclusion and further assessment of these initiatives and activities during implementation of the GSP will facilitate coordination and optimization of these initiatives and activities to support sustainable groundwater management. **Sections 6.2.** through **6.4** describe the identified projects, summarize initial assessment of projects using scenario modeling, and describe identified management actions.

6.2 Project Descriptions

To prevent potential undesirable results and to achieve MOs, a portfolio of projects has been developed and evaluated with the goal of addressing relevant sustainability indicators during GSP implementation. The GSA plans to immediately begin implementation of selected projects. In some cases, initial implementation steps include performing studies or analyses to refine the concepts into actionable projects. **Sections 6.2.1** through **6.2.4** provide descriptions of the projects, including information required by Section 354.44 of the GSP Regulations. Where applicable, a CEQA analysis will be performed for projects. A CEQA analysis includes an assessment of water supply impacts, GHG emissions, and impacts on tribal cultural resources.

The projects described in this section were assembled into different groups for the purposes of performing an initial assessment of benefits using model scenarios:

- Group 1:
  - Water-Use Efficiency and Alternate Water Source Projects
- Group 2:
  - Stormwater Capture and Recharge
- Group 3:
  - ASR (existing municipal wells)

Applicable results from the model scenarios related to expected project benefits are included in project descriptions in **Section 6.2**, summary results are included **Section 6.3**, and details of the methodology and results of model scenarios are included as **Appendix 6-A**. The evaluation of projects and management actions incorporate the future climate change and growth assumptions described in **Section 3.3.6.1.**

6.2.1 Water-Use Efficiency and Alternate Water Source Projects (Group 1)

The water-use efficiency and alternate water source projects include smaller-scale dispersed land-owner projects, such as turf removal, rainwater harvesting, and stormwater capture/reuse. These projects are initially planned as voluntary, incentive-based projects focused on groundwater users, primarily rural, residential, agricultural, and commercial/industrial groundwater users. The programs and education offered to rural domestic and commercial groundwater users will mirror programs offered to regional municipal water users, which have led to a 37 percent reduction in per capita water use since 2010. It is assumed that existing water-use efficiency by municipal groundwater users will continue through the Sonoma-Marin Saving Water Partnership. In addition to the Sonoma-Marin Saving Water Partnership, as described in **Section 2.6**, numerous regional and local water conservation programs are operational in the Plan Area including the LandSmart Program and the Sustainable Winegrowing Program. Many grape growers already use drip irrigation and rely on new technologies to determine when and how much to irrigate vines. This program would be focused on leveraging existing tools and BMPs and working with farmers who have not had either access to or the resources available to reduce water use. Examples of the tools and BMPs included in these programs are:

- Indoor (high-efficiency toilets, fixtures, and washers) and outdoor (landscaping assistance, surveys, and retrofits) water-use efficiency
- Conservation rebate programs for high-efficiency appliances and fixtures, landscape water budgets, landscape and irrigation design, and irrigation scheduling

- Stormwater management through low-impact development practices
- Rainwater harvesting
- BMPs for conserving water use in commercial processing, including wineries
- Soil moisture monitoring and efficient irrigation scheduling

During the first year of GSP implementation, this project will include an assessment of the exact types of water-use efficiency tools and alternate water source projects that are expected to be most effective and feasible for Subbasin stakeholders, including groundwater-use characteristics, existing levels of conservation and water-use efficiency, and recommendations on preferred tools and strategies for implementation (such as incentive options). While implementation of these projects is initially planned to be on a voluntary basis, the assessment will also identify specific metrics for evaluating the benefits of the projects and assess Subbasin conditions that may lead to consideration of mandatory implementation of demand management actions.

6.2.1.1 Objectives, Circumstances and Timetable for Implementation

Implementation of the water use efficiency and alternate water source projects will help achieve MOs and avoid undesirable results for the chronic lowering of groundwater levels sustainability indicator. Achieving MOs and avoiding undesirable results for the chronic lowering of groundwater levels sustainability indicator is also expected to benefit the groundwater storage and land subsidence sustainability indicators. Additionally, depending upon the locations within the Subbasin where Group 1 projects are implemented, benefits to the MOs for the depletion of interconnected surface water sustainability indicator may also be realized.

After a short planning period, it is assumed that water use efficiency and alternate water source project implementation will begin in 2023, while project benefits are assumed to begin in 2025 for the model scenarios. As described above, initial implementation will include an assessment of the exact types of water-use efficiency tools and alternate water source projects that are expected to be most effective and feasible for Subbasin stakeholders. The assessment will also evaluate specific metrics for evaluating the benefits of the projects and assess Subbasin conditions that may lead to mandatory implementation of demand management projects.

6.2.1.2 Expected Benefits

Initial evaluation of potential benefits of the water use efficiency and alternate water source projects were simulated under the Group 1 model scenario. For the purposes of estimating potential benefits of these projects, it was assumed that the Group 1 scenario simulates the impacts of a 20 percent reduction in all rural domestic use and a 10 percent reduction in consumptive use for all vineyards, both beginning in 2025. This assumption was considered to represent a reasonable level of groundwater use reduction based on the outcomes from existing BMPs and other water-use efficiency programs. Other groundwater-use sectors would be included in the project, including commercial, industrial, and other agricultural crops. However, for the purposes of conducting the scenario modeling, only reductions in rural domestic and vineyard groundwater use were applied, as these components were most readily able to be incorporated in the model.

Based on these assumptions and others further described in **Appendix 6-A**, benefits simulated include reduction in the number of potential future MT exceedances and elimination of potential undesirable results for the chronic lowering of groundwater levels, as well as decreasing the decline in groundwater storage. Benefits simulated by the model relative to the baseline scenario for the Group 1 scenario are summarized as follows:

- Simulated project yield: total of 1,800 AFY (1,200 AFY from reduction in agricultural consumptive use, 600 AFY reduction in rural domestic groundwater use)
- Simulated increase in groundwater levels: 5- to 15-foot increases, primarily in the deep aquifer system in the northern portions of the Subbasin
- Simulated increase in groundwater storage: 200 AFY
- Simulated net reduction in surface water depletion: 700 AFY

The planned initial assessment of water use efficiency and alternate water source projects will include recommendations for evaluating specific metrics for the actual benefits of the projects during implementation.

6.2.1.3 Public Noticing, Permitting and Regulatory Process

Public notice and outreach communications will be a critical component to the success of implementing water use efficiency and alternate water source projects, as these actions are initially planned as voluntary and will rely on Subbasin stakeholders clearly understanding their importance and benefits. Activities described in **Section 7.2.2** will include outreach to DACs, tribal, rural residential, commercial, industrial, and agricultural stakeholders focused on highlighting the benefits of participation.

Some of the water use efficiency and alternate water source projects do not have any permitting or regulatory requirements. Any projects that may include permit or regulatory requirements, such as graywater systems, would need to comply with local requirements and ordinances.

6.2.1.4 Estimated Costs and Funding Plan

A total of $90,000 is included in the initial 5-year budget provided in **Section 7.2** to perform the assessment of water use efficiency and alternate water source projects and to fund initial rollout of voluntary measures. To continue and/or expand implementation of water use efficiency and alternate water source projects, the GSA will seek grant funding. The GSA is also considering applying for funding of high-efficiency toilet replacement and agricultural BMP implementation through the State's 2021 Drought Relief Program or other applicable grant opportunities.

6.2.1.5 Legal Authority

No legal authority is anticipated to be needed to voluntarily implement the water use efficiency and alternate water source projects.

6.2.2 Stormwater Capture and Recharge (Group 2)

As described in **Section 2.6**, planning for stormwater capture and recharge efforts, including site investigations and pilot studies, has been initiated by local agencies and growers within the Subbasin. Stormwater capture and recharge projects are intended to cover two general types of stormwater capture activities that have been identified in the Russian River Regional Storm Water Resource Plan (Russian River Watershed Association 2018). The first stormwater capture activity involves retaining and recharging onsite runoff. Examples of this type of activity include low-impact development and on-farm recharge of local runoff. The second stormwater capture activity involves recharge of unallocated storm flows, which could include multi-benefit projects such as managed floodplain inundation. These actions require temporary diversions of storm flows from streams, and conveyance of those flows to recharge locations. State programs and grants (such as FLOOD-MAR, Proposition 68) and local entities (such as RCDs) can be used as resources to move forward on stormwater capture and recharge efforts.

Prior to implementing long-term stormwater capture and recharge programs, site-specific field investigations and assessments will be needed to identify suitable locations. Therefore, early stages of implementing stormwater capture and recharge projects are anticipated to include site-specific investigations and pilot studies of on-farm and other dispersed recharge opportunities that consider and include the following:

- Water available for recharge
- Areas with permeable near-surface soils
- Optimal methods and techniques
- Outreach to interested landowners with locations that could help sustain baseflows to streams and support GDEs

6.2.2.1 Objectives, Circumstances and Timetable for Implementation

Implementation of the stormwater capture and recharge projects are primarily anticipated to help achieve MOs and avoid undesirable results for the depletion of interconnected surface water sustainability indicator. Depending upon the location of stormwater capture and recharge projects, and hydraulic connection between surficial recharge locations and the shallow aquifer system, there may be benefits to the chronic lowering of groundwater levels, groundwater storage and land subsidence sustainability indicators.

Stormwater capture and recharge projects require permitting, environmental analysis, and engineering design, which would begin in 2022. Depending upon results of pilot studies, planned to be initiated in 2024, full-scale implementation of stormwater capture and recharge projects is anticipated to begin in 2028. However, implementation of smaller-scale low-impact development type projects may proceed sooner, as permitting requirements are anticipated to be much less involved that projects that involve recharging diverted streamflows. The timing of projects is based on best estimates and may shift as GSP implementation proceeds, depending upon project needs at the time, permitting timelines, and resources available.

6.2.2.2 Expected Benefits

Expected benefits from implementation of stormwater capture and recharge projects are described in **Appendix 6-A**. Initial evaluation of potential benefits of the stormwater capture and recharge source projects were simulated under the Group 2 model scenario. For the purposes of estimating potential benefits of these projects, the following assumptions were made:

- The Group 2 scenario simulates the effects of stormwater capture and recharge on agricultural lands (On-Farm Recharge) along Mark West Creek, which was selected for initial modeling assessment based on generally favorable soil conditions and presence of GDEs, including critical species.
- The recharge locations were selected based on identifying simulated irrigated agricultural model cells principally downslope of the diversion location selected. There are 184 model cells, or 1,840 acres, that receive equal amounts of diverted water. This initial assessment of Mark West Creek will inform identification of other locations for stormwater capture and recharge projects within the Subbasin during implementation of this project.

The benefits simulated by the model relative to the baseline scenario for the Group 2 scenario are summarized as follows:

- Simulated project yield: 240 AFY of stormwater diverted and recharged
- Simulated increase in groundwater levels: only localized increases in the shallow aquifer system near the recharge areas
- Simulated increase in groundwater storage: 100 AFY
- Simulated net reduction in surface water depletion: 300 AFY, including a 10 percent increase in summertime flows along lower Mark West Creek

Benefits from stormwater capture and recharge projects would primarily be evaluated using changes in measured groundwater levels and surface water flows near and downstream of project locations.

6.2.2.3 Public Noticing, Permitting and Regulatory Process

Public outreach would be conducted to identify landowners interested in participating in stormwater capture and recharge projects. The degree of public noticing will vary depending upon the scale and type of recharge project.

Recharge of stormwater by retaining and recharging onsite runoff does not require permits. Recharge of unallocated storm flows is currently subject to the SWRCB's streamlined permit program for groundwater recharge by capturing high flow events. Recharge of unallocated storm flows will be subject to the terms of these 5-year permits. Stormwater capture may also be subject to CEQA permitting. Additionally, stormwater management projects will need to comply and coordinate with existing NPDES and MS4 permits for regional municipal stormwater systems. Future GSP implementation projects or actions that require their own site-specific monitoring network, such as some stormwater capture and recharge projects, would take into consideration any localized COCs and regulatory requirements to avoid potential impacts on beneficial users, including domestic well users and DACs.

6.2.2.4 Estimated Costs and Funding Plan

A total of $160,000 is included in the initial 5-year budget provided in **Section 7.2** to perform site-specific investigations and fund a pilot study. To continue and expand implementation of stormwater capture and recharge projects, the GSA will coordinate with other project proponents who may be pursing multi-benefit projects, consider providing additional funding in future years, and seek opportunities for grant funding.

6.2.2.5 Legal Authority

In addition to acquiring required permits and the right to divert stormwater, other legal authorities required to implement stormwater capture and recharge will depend upon the lead implementing agency for the projects. CWC Section 10726.2 provides GSAs the authority to purchase, among other things, land, water rights, and privileges.

6.2.3 Aquifer Storage and Recovery (Group 3)

As described in **Section 2.6**, regional planning for ASR and well-specific assessments have been performed by local agencies within the Subbasin (GEI et al. 2013 and City of Santa Rosa 2013c). Conceptually, an ASR program would involve the diversion and transmission of surplus Russian River water produced at existing drinking water production facilities during wet weather conditions (that is, the winter and spring seasons) for storage in the deep aquifer system of the Subbasin. The stored water would then be available for subsequent recovery and use during dry weather conditions (that is, the summer and fall seasons) or emergency situations. The Groundwater Banking Feasibility Study (GEI et al. 2013) provided an evaluation of the regional needs and benefits, source water availability and quality, regional hydrogeologic conditions, and alternatives for groundwater banking. Based on the findings from the study, pilot studies to further assess the technical feasibility of ASR as a method for groundwater banking were recommended and in 2018 a pilot project was completed in the nearby Sonoma Valley Subbasin (GEI et al. 2020).

The feasibility study also found that adequate water for a hypothetical 5,000 AFY groundwater recharge program would be available for diversion from Sonoma Water's diversion facilities along the Russian River more than 90 percent of the time. This divertible flow was calculated by simulating the river system operations to meet Sonoma Water demands, simulating Sonoma Water diversions, and then subtracting minimum flows needed to meet the Biological Opinion and other instream requirements. In general, water is expected to be available for groundwater recharge in most years during the months of December through May. Because of the high-flow rates in these winter and spring months (with 100 cfs or more divertible flow expected 90 percent of the time), this pattern of availability is expected to be present under higher future levels of demand. Some water would also be available for diversion to groundwater storage during June through November, though less frequently (GEI et al. 2013). An updated assessment of water available for recharge will be performed during the early stages of GSP implementation.

Prior to implementing long-term ASR programs in the Santa Rosa Plain Subbasin, pilot studies are recommended to verify location specific feasibility, including aquifer capacity for recharge and recovery operations and geochemical compatibility. Pilot testing involves injecting potable drinking water into the Subbasin's aquifers and recovering it to assess injection and recovery capacities and monitor potential water quality impacts to native groundwater resources. Information generated by pilot test evaluations will help inform the degree to which ASR is a feasible strategy to improve the reliability water supply, along with helping to evaluate whether or not an ASR project can be developed and operated in a manner that will achieve both supply reliability and groundwater sustainability benefits. Therefore, early stages of implementing ASR projects are anticipated to include both site-specific investigations and pilot studies. Additionally, it is recommended that the 2013 Groundwater Banking Feasibility Study be updated to address current source water (Russian River) availability and transmission system capacity assumptions, perform an assessment of locations and operations that specifically benefit GSP implementation, and design and implement pilot studies for favorable areas.

It is also recognized that other water purveyors are pursuing initiation of ASR in the Subbasin on a more expedited timeframe in response to the 2020/2021 drought and associated funding opportunities. Specifically, Sonoma Water is developing plans to implement ASR at two of its production wells within the Santa Rosa Plain as part of its Santa Rosa Plain Drought Resiliency Project. The GSA will coordinate and provide support for planning and implementation of ASR projects that may be developed and implemented by Sonoma Water and other project proponents in response to current drought conditions.

6.2.3.1 Objectives, Circumstances and Timetable for Implementation

Implementation of ASR projects will help achieve MOs and avoid undesirable results for the chronic lowering of groundwater levels sustainability indicator. Achieving MOs and avoiding undesirable results for the chronic lowering of groundwater levels sustainability indicator is also expected to benefit the groundwater storage and land subsidence sustainability indicators. Additionally, depending upon the locations within the Subbasin where ASR projects are implemented, benefits to the MOs for the depletion of interconnected surface water sustainability indicator may also be realized.

ASR projects require permitting, environmental analysis, and engineering design, which would begin in 2022. Depending upon results of pilot studies, planned to be initiated in 2024, full-scale implementation of ASR projects is anticipated to begin in 2028. The timing of projects is based on best estimates and may shift as GSP implementation proceeds based upon the needs at the time. As noted earlier, this timeframe may be further accelerated in response to the 2021/2022 drought.

6.2.3.2 Expected Benefits

Expected benefits from implementation of ASR projects include:

- Limiting the potential for chronic lowering of groundwater levels and undesirable results for other associated sustainability indicators.
- Enhanced reliability of the regional water supply during droughts, natural hazard events (such as, earthquakes), and periods of peak seasonal water demands.

For the purposes of assessing the effects, ASR was simulated in wells owned by Sonoma Water, City of Cotati, City of Rohnert Park, City of Santa Rosa, and Town of Windsor that have been initially assessed and deemed potentially feasible for ASR operations in previous studies (GEI et al. 2013 and City of Santa Rosa 2013c) Potential benefits from implementation of ASR projects based on the scenario modeling are described in **Appendix 6-A**. Based on the assumptions described in **Appendix 6-A**, benefits simulated include reduction in the number of potential future MT exceedances for the chronic lowering of groundwater levels, as well as decreasing the decline in groundwater storage. The following summarizes benefits simulated by the model relative to the baseline scenario for the Group 3 scenario:

- Simulated project yield: 940 AFY of drinking water diverted and recharged
- Simulated increase in groundwater levels: 5- to 10-foot increases over large areas of northern and southern portions of the Subbasin
- Simulated increase in groundwater storage: less than 100 AFY
- Simulated net reduction in surface water depletion: 300 AFY

Benefits from ASR projects would primarily be evaluated using changes in measured groundwater levels and improvements to groundwater storage changes.

6.2.3.3 Public Noticing, Permitting and Regulatory Process

Public notice for aspects of the ASR pilot projects will be carried out by the lead agency for each project. For ASR projects where the GSA is not the lead agency, the GSA will provide support for outreach activities to nearby well owners and the local community. For the full-scale ASR project, public notice is anticipated to occur through compliance with CEQA for any facilities or plans associated with the project. This includes the development of an underground storage supplement to permit the storage of water in the Subbasin that is required by the SWRCB, and through publicly noticed discussions of the proposed project at public meetings. CEQA analysis includes an assessment of water supply impacts, GHG emissions, and impacts on tribal cultural resources.

The SWRCB has recognized that it in the best interest of the state to develop a comprehensive regulatory approach for ASR projects, and has adopted general waste discharge requirements for ASR projects that inject drinking water into groundwater (Order No. 2012-0010-DWQ or ASR General Order). The ASR General Order provides a consistent statewide regulatory framework for authorizing both pilot ASR testing and permanent ASR projects. Pilot tests and any future permanent ASR facility will be permitted under the ASR General Order. Oversight of these regulations is done through the RWQCBs and will require project proponents to comply with the monitoring and reporting requirements of the ASR General Order. Any additional permits required for the construction and operation of an ASR facility will be obtained by the lead agency for each ASR project as needed. Future GSP implementation projects or actions that require their own site-specific monitoring network, such as ASR, would take into consideration any localized COCs and regulatory requirements to avoid potential impacts on beneficial users, including domestic well users and DACs.

6.2.3.4 Estimated Costs and Funding Plan

Preliminary cost estimates to test, permit and construct project facilities for ASR is estimated to range from about $300,000 to $3,600,000 depending upon the complexity of each project with the lower cost estimates representing the use of existing wells that have the necessary monitoring infrastructure (GEI et al. 2013). The range of the costs also varies dependent upon whether existing facilities could be retrofitted or new facilities would need to be constructed. Preliminary costs will need to be further refined and provided upon completion of site-specific evaluation and pilot testing. The current plan for developing ASR in the Subbasin would utilize to the greatest extent possible existing infrastructure, meaning that new infrastructure would be greatly limited, thus allowing for earlier onset of both incremental drought supply and groundwater sustainability benefits.

A total of $150,000 is included in the initial 5-year budget provided in **Section 7.2** to contribute to an updated regional ASR feasibility study and to complete site-specific investigations of favorable areas. To continue and expand implementation of ASR projects, the GSA will coordinate with other project proponents who may be pursuing ASR projects, consider providing additional funding in future years, and will seek opportunities for grant funding.

6.2.3.5 Legal Authority

Local water supply agencies and the GSA have the authority to develop water supply projects, such as ASR for both water supply benefits and to provide groundwater sustainability benefits.

6.3 Evaluation of Projects Through Scenario Modeling

For the purposes of conducting initial evaluation of projects for this GSP, staff assembled conceptual projects and actions that are likely to be initiated within the first 5 years of implementation into two general categories:

- Those that have identified potential funding sources, or are voluntary or incentive-based with lower-costs (Group 1 projects). The Group 1 projects represent voluntary, incentive-based water-use efficiency and alternate water source projects focused on non-municipal groundwater users. Examples include smaller-scale dispersed land-owner projects, such as turf removal, rainwater harvesting, and irrigation efficiency practices. The exact types of these dispersed projects are not distinguished for the purposes of evaluating potential benefits using model scenarios.
- New or significantly expanded projects and actions that would require further studies and planning for implementation (Group 2 and 3 projects). Both Group 2 and Group 3 projects represent managed aquifer recharge projects that aim to maintain or raise groundwater levels and improve summer and fall streamflows. The Group 2 projects represent stormwater capture and recharge projects that could specifically benefit streamflows within the Subbasin and help comply with the SMC for depletion of interconnected surface water. Group 3 projects represent ASR projects that can reduce municipal pumping of native groundwater, help address many sustainability indicators, primarily the chronic lowering of groundwater levels, and build drought-resiliency.

These two general categories formed the basis for model scenarios of potential projects. The model scenarios were performed as an initial evaluation of benefits of the Group 1-3 projects relative to the baseline 50-year projected scenario and incorporate the future climate change and growth assumptions described in **Section 3.3.6.1**. **Table 6-1** summarizes the simulated yields expected for each group.

Table 6-1. Summary of Project Groupings and Yields

Project	Group 1	Group 2	Group 3
Reduce Crop Consumptive Use	Averages 1,200 AFY less agricultural pumping than baseline simulation	Same as Group 1	Same as Group 1
Reduce Rural Domestic Pumping	Averages 600 AFY less agricultural pumping than the baseline simulation	Same as Group 1	Same as Group 1
Stormwater Managed Aquifer Recharge	None	Average deliveries of 240 AFY	Same as Group 2
Aquifer Storage and Recovery	None	None	940 AFY

Approximate locations of the Group 2 and Group 3 projects are shown on **Figures 6-1** and **6-2**, respectively. The locations for Group 1 projects are distributed across the Subbasin. The methodology and results of the scenario modeling are described in **Appendix 6-A** and summary results of potential benefits are provided after the figures.

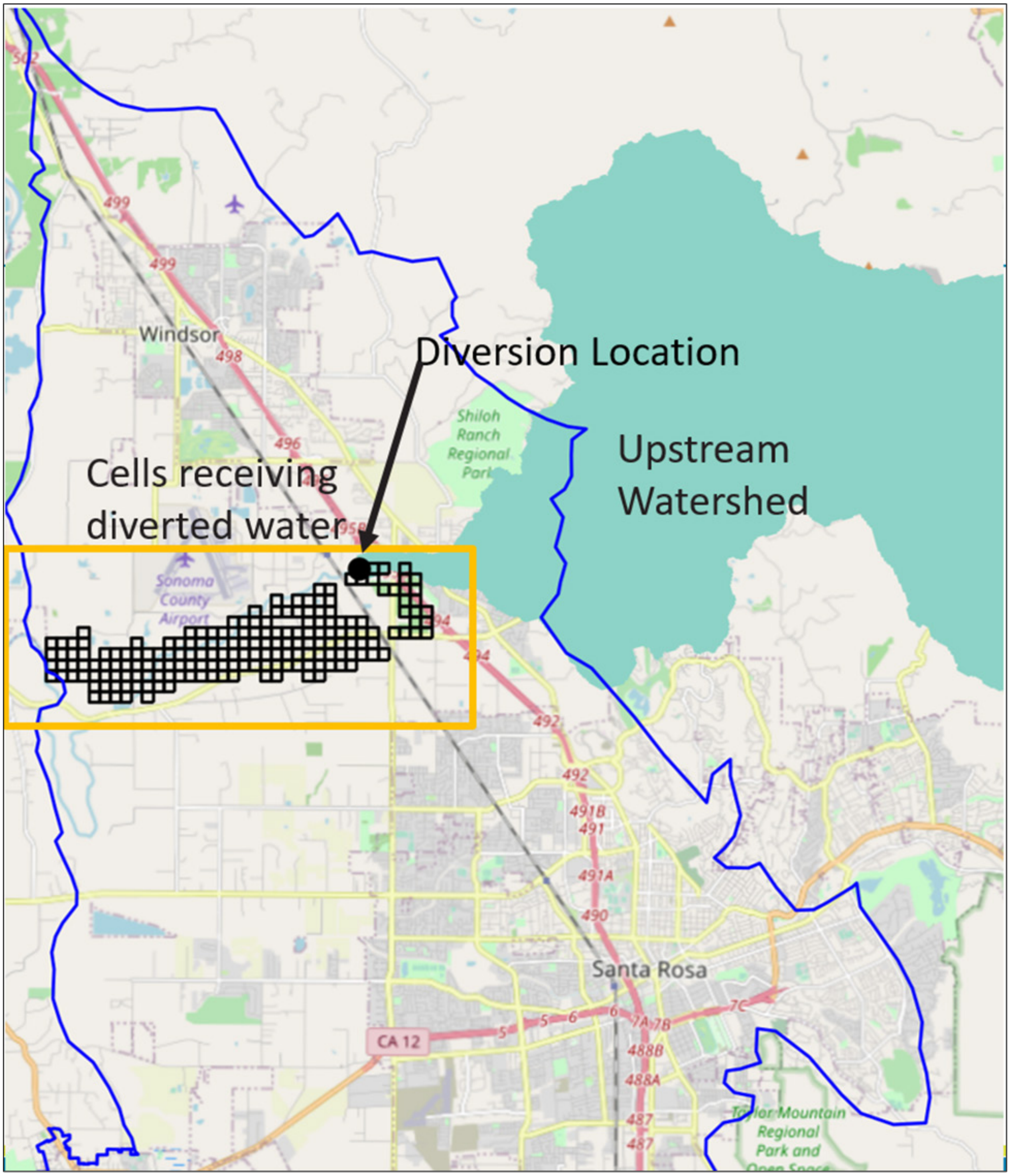

Figure 6-1. Locations of Simulated Stormwater Capture and Recharge Projects

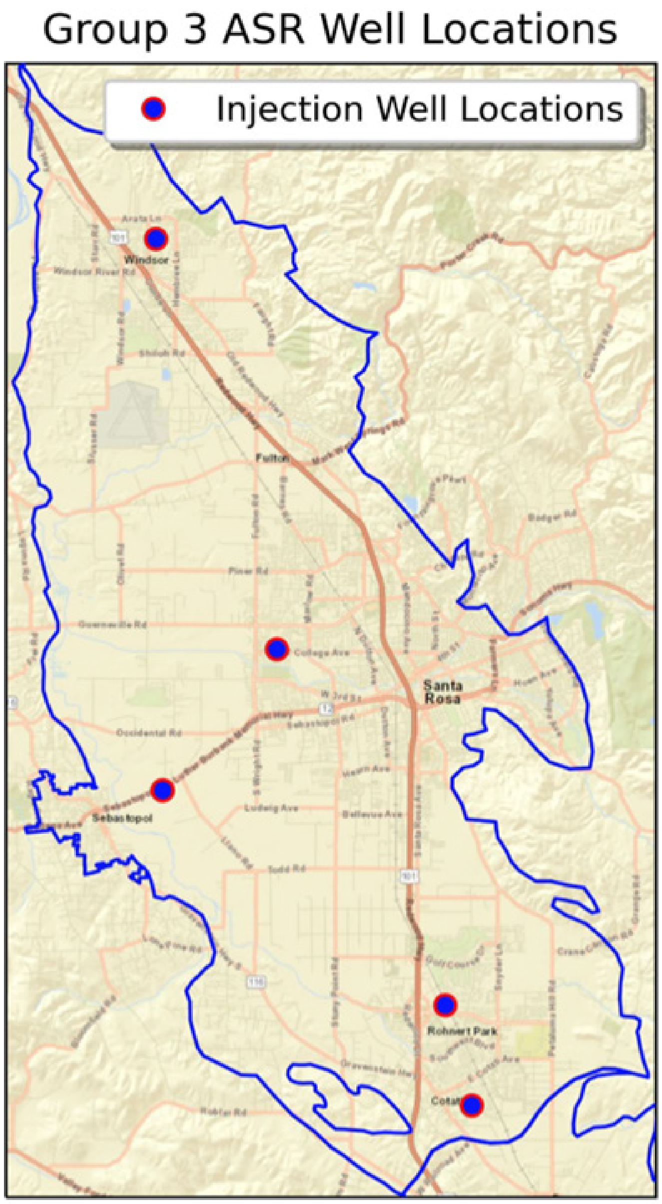

Figure 6-2. Locations of Simulated Aquifer Storage and Recovery Projects

General findings from the model scenarios indicate the following:

- **Groundwater Levels**: In the baseline scenario, groundwater levels in the shallow and deep aquifers remain above MTs for the first 20-year period. Groundwater levels generally fall below MTs in the last 11 years of the 50-year projected baseline water budget, primarily in RMPs in the deeper aquifer, potentially leading to undesirable results. The cumulative projects remove all occurrences of undesirable results by decreasing MT exceedances in RMP wells from 66 to 18. Implementation of Group 1 results in greatest decline in MT exceedances in RMP wells and eliminates potential undesirable results that are simulated to occur during the baseline 50-year projection.

- **Groundwater storage:** Groundwater in storage under a baseline scenario without projects is estimated to decline by an average of 200 AFY between 2021 and 2040 and 1,400 AFY over the entire 50-year projection period that includes a simulated extreme 20-year drought between 2050 and 2070. Cumulative projects are simulated to increase the amount of groundwater in storage by 400 AFY between 2021 and 2040 (resulting in an average 200 AFY storage increase) and reduce the average decline by 300 AFY over the entire 50-year projection (resulting in an average 1,100 AFY storage decline).

- **Stream-Aquifer Interaction:** Higher groundwater levels near streams can better support streamflow, particularly in the summer and fall months. The addition of the Group 2 projects increases simulated summer streamflow by 10 percent in Mark West Creek.

Project scenarios help limit groundwater declines during the latter portion of the projected period (affected by the major drought). Although MT exceedances are not completely avoided during this more extreme dry period under these scenarios, the exceedances during severe droughts are not representative of undesirable results unless groundwater levels do not recover during subsequent wetter time periods.

Considering current uncertainties due to modeling, data gaps, and project information, these project scenarios provide a pathway for reaching sustainability and preparing for future changed conditions in the Subbasin to meet GSP requirements. Additional data collection and project conceptualization during early phases of GSP implementation will help refine these scenarios and allow for consideration of additional scenarios, including additional demand management actions, if necessary to achieve sustainability. The projects will also be supplemented by the following planned management actions, which include an assessment and prioritization of policy options that include demand management actions for the GSA Board to consider.

6.4 Management Actions and Projects Requiring Additional Assessment

In addition to initiating the projects described above, the GSA will further assess the following management actions and potential future projects that require additional assessment and planning:

- Coordination of Farm Plans with GSP implementation
- Assessment of additional recycled water opportunities
- Assessment and prioritization of potential policy options

Additionally, as provided by SGMA, should the above-described projects and management actions not be sufficient to eliminate undesirable results during implementation of the GSP, the GSA has authorities to limit groundwater pumping. **Section 6.4.3** further describes these authorities and potential situations where they may be considered.

6.4.1 Coordination of Farm Plans with Groundwater Sustainability Plan Implementation

Farm Plans are voluntary plans developed by third party organizations in collaboration with individual landowners that identify best management practices and provide site-specific actions to mitigate issues like sediment runoff or to improve water quality. In some areas of California, regulatory fees are reduced for landowners with Farm Plans that are certified by agreed-upon third parties. Currently, most Farm Plans do not include aspects of groundwater management that would directly support the GSA's efforts to comply with the requirements of the SGMA.

This management action involves a collaboration between the three Sonoma County GSA's and interested members of the agricultural community to evaluate the feasibility of developing a program that coordinates Farm Plans, developed at individual farm sites, with the implementation of the basin-wide GSP. This effort will identify areas of mutual interest (for example, improved water use efficiency, increased groundwater recharge, increased monitoring and data collection, coordinated information sharing, and reporting) in addition to challenges that need to be addressed (for example, data confidentiality, data quality requirements, verification of Farm Plan performance).

6.4.1.1 Objectives, Circumstances and Timetable for Implementation

Objectives of the management action include:

- Strengthening partnerships and coordination between the GSA and growers
- Identifying requirements or standards that need to be met to demonstrate that the implementation of the Farm Plan contributes to compliance with SGMA
- Developing metrics that will be measured and verified during implementation of the Farm Plan
- Considering options for Farm Plan sites to receive a form of credit for the contributions of the subject farm to the compliance with SGMA.

Coordination activities will begin in the first year of GSP implementation and it is anticipated that within 1 year of funding approval, staff would submit a report to the GSA Board with recommendations on the viability of such a program and next steps, as appropriate.

6.4.1.2 Expected Benefits

Expected benefits would include information sharing and coordination between the GSA and growers within the Subbasin. Other benefits will depend upon the outcome of the coordination activities and identification of mutual areas of interest to incorporate into Farm Plans. Potential areas of benefit include improvements to the GSAs monitoring network, filling key data gap areas, and advancing projects (such as water-use efficiency or recharge projects) that support the sustainability goal and avoid undesirable results to sustainability indicators.

6.4.1.3 Public Noticing, Permitting and Regulatory Process

Public notice of actions and outcomes from the coordination process would be provided at the GSA's regular Board and Advisory Committee meetings. The permitting and regulatory process would depend upon the outcome of the coordination and identification of mutual areas of interest to include within the Farm Plans.

6.4.1.4 Estimated Costs and Funding Plan

A total of $40,000 is included in the initial 5-year budget provided in **Section 7.2** for developing and beginning implementation of the work plan. It is assumed that costs for portions of the study will be shared with the Petaluma Valley and Sonoma Valley GSAs.

6.4.1.5 Legal Authority

Any needed legal authorities would depend upon the outcome of the coordination and identification of mutual areas of interest to include within the Farm Plans.

6.4.2 Assessment of Additional Recycled Water Opportunities

The use of recycled water for agricultural and landscape irrigation within the Subbasin has provided substantial benefits to groundwater conditions. During the current water budget period, it is estimated that approximately 10,000 AFY of recycled water is delivered within the Subbasin for agricultural and landscape irrigation, significantly reducing the need for use of groundwater and other potable water supplies. As described in **Section 6.1**, based on limitations and uncertainty related to the potential for future expansion of recycled water supplies, additional expansion of recycled water deliveries for irrigation supplies was not included with the projects evaluated using scenario modeling.

This project involves a collaboration between the GSA and City of Santa Rosa and participating cities for the Santa Rosa Water Reuse System, Town of Windsor, and Sonoma Water for the Airport/Larkfield/Wikiup Sanitation Zone to perform an assessment of additional recycled water opportunities. It is anticipated that the assessment will include:

- Evaluation of existing and future availability, delivery commitments, and constraints
- Assessment of options to optimize existing and projected future supplies
- Analysis of preliminary costs and benefits for future options

6.4.2.1 Objectives, Circumstances and Timetable for Implementation

Objectives for expanding recycled water deliveries are to help achieve MOs and avoid undesirable results for the chronic lowering of groundwater levels sustainability indicator. Achieving MOs and avoiding undesirable results for the chronic lowering of groundwater levels sustainability indicator is also expected to benefit the groundwater storage and land subsidence sustainability indicators. Additionally, depending upon the locations within the Subbasin where recycled water projects are expanded, benefits to the MOs for the depletion of interconnected surface water sustainability indicator may also be realized.

It is assumed that the assessment will begin within the first 2 years of GSP implementation.

6.4.2.2 Expected Benefits

Potential benefits from implementation of expanding and maximizing the efficiency of recycled use is anticipated to include a reduction in groundwater pumping and localized increases in groundwater levels. Benefits from recycled water projects would primarily be evaluated using changes in measured groundwater levels and improvements to groundwater storage changes through implementation of the monitoring activities described in **Section 5**.

6.4.2.3 Public Noticing, Permitting and Regulatory Process

Public notice of actions and outcomes from the assessment would be provided at the GSA's regular Board and Advisory Committee meetings. While the permitting and regulatory process would depend upon the outcome of the assessment, each of the water recyclers within the Subbasin currently complies with all applicable permitting and regulatory requirements associated with recycled water use.

6.4.2.4 Estimated Costs and Funding Plan

A total of $30,000 is included in the initial 5-year budget provided in **Section 7.2** for the GSA to coordinate with recycled water purveyors to perform the necessary assessment.

6.4.2.5 Legal Authority

Each individual water recycler within the Subbasin owns its recycled water and has the legal authority to sell its recycled water in alignment with its policies. CWC Section 10726.2 provides GSAs the authority to purchase, among other things, land, water rights, and privileges.

6.4.3 Assessment of Potential Policy Options for Groundwater Sustainability Agency Consideration

SGMA provides several authorities to GSAs, which can be used to achieve groundwater sustainability and requires coordination between GSAs and land use agencies. This management action involves a collaboration between the GSA Board, local land use agencies, GSA member agencies, and stakeholders to assess future policy options that may be appropriate for the GSA to consider adopting or recommending for adoption by other agencies. This study will prepare a prioritized list of potential policy options, including stronger demand management actions that may need to be adopted should the projects described above not be implementable or successful. Based on input from the Advisory Committee, GSA Board, and the public, the following initial list of policy options has been developed for potential inclusion in the assessment:

- Water conservation plan requirements for new development.
- Discretionary review of well permits for any special areas identified in GSP

- GSA review of discretionary projects that impact groundwater resources
- Low-impact development or water efficient landscape plan requirements expansion
- Well construction and permitting recommendations (for example, water quality sampling and reporting for COCs, requirement for water-level measurement access, and procedures for preventing cross-screening of multiple aquifers)
- Well metering program
- Development of a drinking water well mitigation program
- Study of water markets
- Permitting and accounting of water hauling

This list represents initial ideas for policy options, which will be informed through the continued stakeholder engagement and outreach described in **Section 7**. As required by SGMA, it is expected that the GSA will participate with the County in the development of future General Plan amendments and updates. During this process, additional policy options may be developed and considered.

6.4.3.1 Objectives, Circumstances and Timetable for Implementation

The objectives for this management action are to develop, prioritize, and vet potential policy options that may be needed to supplement or replace the projects. As the timeframe for conducting the community outreach, studies, and procedural requirements for adopting policy options can be lengthy, the assessment and prioritization will be initiated in the first year of GSP implementation. The circumstances and timetable for adopting and implementing any of the recommended policy options will be based on ongoing monitoring of groundwater conditions and progress of project implementation. Policy options that focus on demand management would be applied in the case of a situation where planned projects and management actions are determined to be insufficient to reach and/or maintain sustainability and undesirable results are occurring and are not projected to be eliminated by 2042 using other available projects and management actions.

6.4.3.2 Expected Benefits

Specific expected benefits for this management action will depend upon the type and scope of any policy options that are recommended and adopted by the GSA Board and/or partner agencies. However, the types of policy options considered and recommended will be those that focus on avoiding undesirable results and achieving the sustainability goal.

6.4.3.3 Public Noticing, Permitting and Regulatory Process

Public noticing will be a key aspect of implementing this management action, as considerable engagement with stakeholders will be needed to assess potential benefits and impacts to current and future groundwater users. Any policy options that result in limitations or curtailments of groundwater users would be conducted in an open and transparent process. The permitting and regulatory process associated with this management option will also depend upon the type of policy options under consideration.

6.4.3.4 Estimated Costs and Funding Plan

A total of $75,000 is included in the initial 5-year budget provided in **Section 7.2** for the GSA to perform the assessment and initiate implementing recommendations. The total cost associated with implementing the management action will depend upon the type and scope of any policy actions considered for implementation.

6.4.3.5 Legal Authority

The legal authorities required for implementing any policy options will depend upon the type of policy options being considered. For policy options that include mandatory reductions or limitations on groundwater use, CWC Section 10726.4(a)(2) provides GSAs with the authority to control groundwater extractions by regulating, limiting, or suspending extractions from individual groundwater wells or extractions from groundwater wells in the aggregate. Legal authorities for policy options that involve land use policy changes are retained by the County and cities within the subbasin. Similarly, for any policy options related to well permitting, the legal authorities reside with the County.

Section 7: Implementation Plan
Groundwater Sustainability Plan for Santa Rosa Plain Groundwater Subbasin

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7-A. Model Maintenance and Improvements for the Santa Rosa Plain Groundwater Sustainability Plan

7 IMPLEMENTATION PLAN

This implementation plan serves as an initial roadmap for addressing GSP implementation activities between 2022 and 2042 with a primary focus on implementation activities within the initial 5 years (2022 through 2026). This section describes the plans for implementing the activities and actions identified in **Sections 4** through **6** in this GSP, including the following:

- The GSA's governance structure and planned administrative approach
- The main implementation components and estimated costs for the initial 5 years of implementation
- The initial approach to funding
- A schedule

This implementation plan is based on the current understanding of Subbasin conditions, identified data gaps, monitoring needs and projects, and management actions. To successfully implement the GSP, the implementation plan will adapt over time based on new information and data, model development, and input from Subbasin stakeholders.

7.1 Governance Structure and Planned Administrative Approach

The GSA anticipates that the current governance and general administrative structure will remain in place through the implementation period. As described in **Section 1.3.2**, the 10 member agencies currently plan to continue operating under the Joint Powers Authority agreement that created the GSA. The Board will continue serving as the governing body, making decisions regarding implementation of projects and management actions; closing data gaps; contracts; administration; funding; and other governance issues. A stakeholder-based Advisory Committee representing multiple stakeholder interests will continue providing guidance and recommendations to the Board and GSA staff. Both the GSA Board and Advisory Committee will continue to hold regular public meetings in compliance with California's laws governing public meetings (commonly known as the Brown Act).

Currently, the GSA contracts with Sonoma Water for technical, outreach, grant administration, and GSA management services and contracts with other consultants for legal, facilitation, and some monitoring services. As the GSA transitions from GSP development to implementation starting in 2022, staffing needs will be evaluated to determine the most efficient and effective move forward. To reduce costs and for consistency for groundwater users within Sonoma County, it is possible that the GSA will coordinate management and other services with the Petaluma Valley and Sonoma Valley GSAs.

7.2 Groundwater Sustainability Plan Implementation Components and Estimated Costs

This section describes details of each of the main implementation components, assumptions, and estimated costs for the initial 5 years.

7.2.1 Administration and Finance

Administration and finance costs include day-to-day management of the agency, as-needed legal costs, costs associated with applying for and administering grants, tasks associated with implementation of a fee, auditing and accounting services, administration of the well registration program, facility fees, and office supplies. Annual administration costs are estimated to range from $250,000 to $300,000 annually.

7.2.2 Communication and Stakeholder Engagement

To meet the requirements of SGMA, the GSA will continue the activities described in **Section 1**, including the following:

- Holding regular meetings of a diverse, stakeholder-based Advisory Committee to receive feedback on implementation efforts and to solicit outreach ideas and assistance
- Informing, educating, and soliciting feedback from stakeholders on the progress of implementing projects and management actions and on Subbasin conditions through social media, the GSA website, periodic community/town hall meetings, focused stakeholder briefings, and paid and free media
- Approaching and engaging a diverse set of stakeholders and groundwater users by continuing to reach out to and meet with organizations that represent DACs (including Spanish-language engagement), farmers, environmental interests, rural landowners, and business interests
- Conducting government-to-government communication with federally and non-federally recognized Tribal governments to reassess interest in participating in GSA activities

The GSA will maintain and improve two products currently under development: The Groundwater User Information Data Exchange program, which allows well owners to review and correct well and groundwater-use information, and the Groundwater Data Dashboard, which will provide groundwater data in a visual, user-friendly format.

The GSA will conduct, in cooperation with other agencies or organizations, outreach and education programs on specific topics relevant to groundwater users within the Subbasin, such as the importance of well maintenance, management, and best practices with the goal of empowering well owners to understand well construction, pump and storage practices, water quality considerations and treatment options, and well abandonment.

In addition, the GSA will continue to engage and coordinate with local, state, and regional agencies (including GSA member agencies, other GSAs, Permit Sonoma, Agricultural Commissioner, Sonoma County Ag + Open Space District, DWR, SWRCB-DDW and Water Rights

Division, and NCRWQCB) to fill data gaps and implement projects and actions. This coordination will include discussions of partnering opportunities for funding implementation components that are mutually beneficial.

A focused area of engagement in the early stages of GSP implementation is anticipated to be continued coordination and information sharing with agencies that have land use responsibilities and authorities, including Permit Sonoma, city planning departments, and county and city planning commissions. This coordination will build on ongoing coordination that has occurred through development of the GSP and activities that Permit Sonoma has initiated using Proposition 68 grant funding. Coordination will include sharing of information, including tracking land use changes, the number of new well permits, and new agricultural permits (including cannabis projects) within the Subbasin/contributing watershed and surrounding areas. In addition, as required by SGMA, the GSA will engage in and review General Plan amendments, other local policies and issues related to groundwater resources in the Subbasin.

An important component of this engagement will be ongoing coordination with agencies responsible for regulating groundwater quality. The GSA will regularly coordinate with NCRWQCB, SWRCB-DDW, and others to understand and develop a process for determining if groundwater management is resulting in degraded water quality and to assess whether any additional COCs should be considered in the future.

Annual outreach and communication are estimated to range in cost from approximately $95,000 to $120,000 per year.

7.2.3 Annual Monitoring, Data Evaluation, and Reporting

Monitoring of the five applicable sustainability indicators is a key component for successful implementation of the GSP. Most monitoring relies on existing monitoring programs, some of which will be enhanced or expanded as described in **Section 5** and **Section 7.2.4.2**. Data from the monitoring programs will be routinely evaluated to ensure progress is being made toward sustainability, or to identify whether undesirable results are occurring, and assess and investigate conditions that may lead to undesirable results. Data will be maintained in the Data Management System and will be used by the GSA to guide decisions on projects and management actions and to prepare annual reports to Subbasin stakeholders and DWR.

7.2.3.1 Monitoring and Data Evaluation

Specific planned monitoring activities are summarized herein and in **Table 7-1** and are more fully described in **Section 5**.

Groundwater-level monitoring activities will include the collection of groundwater-level data at the 26 existing RMPs and new planned RMPs identified in **Section 5.3.1** for comparison to MTs and MOs. The groundwater-level monitoring will also include the coordination and evaluation of measurements from 80 additional wells within the Subbasin and contributing watershed areas, as well as outside of the contributing watershed areas along basin boundaries, as described in **Section 5.2.1**, to continue tracking trends in these wells with historical data, assess changes in groundwater elevations near boundaries, and support the development of groundwater-level contour maps and storage change estimates. The groundwater-level data will be collected in accordance with the monitoring protocols outlined in **Section 5.3.1**. Monitoring network data gaps identified in **Section 5.4.1** will be addressed through the activities described in **Section 7.2.4**. Groundwater elevation data will be uploaded to the DWR data portal semiannually, before January 1 and July 1 of each year.

- Water quality monitoring activities will include the compilation and evaluation of water quality data reported from existing public water supply wells and compared with the MTs and MOs for the water quality sustainability indicator.
  - For the water quality sustainability indicator, the data review will focus on exceedances of MTs, or MCLs and SMCLs for the three COCs (arsenic, nitrate, and TDS) identified for this GSP. However, if during review of the water quality data additional constituents appear to frequently exceed MCLs and SMCLs, MTs and MOs will be considered for these additional constituents during GSP 5-year updates. The number of public water supply wells routinely monitored for each COC is in **Table 7-1**. If any other routine monitoring of supply wells is initiated in the Subbasin at a later date, these wells will also be considered for inclusion in the water quality monitoring network.
- Monitoring for land surface subsidence will be measured using satellite InSAR data provided by DWR. InSAR data will be downloaded from the DWR website annually, checked and verified for completeness and reasonableness, and used to develop annual change in elevation maps. The average value for each 100 square meter pixel and elevation change maps will be used to compare with MTs and MOs for the land surface subsidence sustainability indicator.
- Monitoring for surface water and groundwater interaction will include the following monitoring activities:
  - Compilation and evaluation of surface water data from 18 active stream gages within the Subbasin and contributing watershed area.
  - Measurement and evaluation of groundwater elevations from the seven RMPs used to monitor surface water depletion as a proxy. For reporting seasonal highs and lows for future comparison with MTs, all measurements collected more frequently than monthly will be reported as monthly averages to better align with the measurement frequency within historical datasets used to calculate the MTs.
  - Assessment and improvement of the monitoring network for surface water and groundwater interaction as described in **Section 7.2.4.1**.

Table 7-1. Monitoring Networks and Initial Representative Monitoring Point Networks

Sustainability Indicator	Monitoring Network	Initial Representative Monitoring Point Network
Chronic Lowering of Groundwater Levels	96 wells within the contributing watershed area (including 85 wells in the Subbasin) 61 wells are inferred to primarily monitor the shallow aquifer 35 wells inferred to primarily monitor the deep aquifer	14 existing and 4 new shallow aquifer system wells 12 existing and 4 new deep aquifer system wells
Subbasin Boundary Groundwater-level Monitoring Network (this network provides information on boundary conditions, but is not used for RMPs)	16 wells outside boundaries but within contributing watershed, including: 8 wells: Wilson Grove Formation Highlands Basin 1 well: Petaluma Valley Basin 3 wells: Rincon Valley Subbasin 1 well: Alexander Valley Subbasin 2 wells: outside of defined basins	
Reduction in Groundwater Storage	Same as monitoring network for Chronic Lowering of Groundwater Levels	Same as monitoring network for Chronic Lowering of Groundwater Levels
Degraded Water Quality	Existing supply well groundwater quality monitoring programs, as follows: Arsenic: 104 wells Nitrate: 122 wells Salts: 92 wells	Existing supply well groundwater quality monitoring programs, as follows: Arsenic: 104 wells Nitrate: 122 wells Salts: 92 wells
Land Surface Subsidence	Three GPS locations; InSAR satellite in most of the Subbasin	InSAR dataset
Interconnected Surface Water	18 stream gages; 10 shallow monitoring wells adjacent to streams	Seven shallow monitoring wells adjacent to streams

7.2.3.2 Annual Reports

Annual reports will be developed to present data, information, and the implementation status for each WY and meet SGMA requirements. As defined by DWR, annual reports must be submitted for DWR review by April 1st of each year following the GSP adoption, except in years when 5-year or periodic assessments are submitted. Annual reports are anticipated to include three key sections: General Information, Subbasin Conditions (including SMC status and progress towards achieving measurable objectives), and Implementation Actions and Activities.

General Information

The General Information section will include an executive summary that highlights the key content of the annual report. This section will include a map of the Subbasin, a description of the sustainability goal, a description of GSP projects and their progress, and an annual update to the GSP implementation schedule.

Subbasin Conditions

The Subbasin Conditions section will describe the current groundwater conditions and monitoring results. This section will also include an evaluation of how conditions have changed over the previous year and will compare groundwater data for the WY to historical groundwater data. Estimated pumping data, effects of project implementation (if applicable), surface water deliveries, total water use, and groundwater storage data will be included. Key required components include the following:

- Groundwater-level data from the monitoring network, including contour maps of seasonal high and seasonal low water-level maps
- Hydrographs of groundwater elevation data at RMPs
- Groundwater extraction data and estimates by water-use sector
- Groundwater quality at RMPs
- Surface water supply availability and use data by water-use sector and source
- Streamflow data
- Total water-use data
- Change in groundwater in storage
- Subsidence rates and associated data

As part of the monitoring program reporting, status of SMC will also be reported, including MT and MO status for RMPs. Additionally, information on land use changes and additional permitting of wells and projects that use groundwater will be tracked and reported in the annual reports.

Groundwater Sustainability Plan Implementation Progress

Progress toward GSP implementation will be included in the annual reports. This section of the annual report will describe the progress made toward achieving interim milestones as well as implementation of projects and management actions. Key required components include the following:

- GSP implementation progress, to be measured by whether the GSA is achieving the milestones provided on the Implementation Schedule (**Figure 7-1**)
- Progress toward achieving the Subbasin sustainability goals
- Any changes that may be considered necessary for successful GSP implementation

Development of an annual report will begin following the end of the WY, September 30, and will include an assessment of the previous WY. The annual report will be submitted to DWR before April 1 of the following year. The 2022 annual report covering WY 2021 will be submitted by the GSA by April 1, 2022. Four annual reports for the Subbasin will be submitted to DWR each April between 2022 and 2025, prior to the first 5-year update of this GSP, which will be prepared in 2026 and submitted to DWR in January 2027.

The estimated annual cost of performing annual monitoring, data evaluation, and reporting ranges from $225,000 to $275,000, with a cumulative 5-year cost ranging from $1,125,000 to $1,375,000.

7.2.4 Addressing Data Gaps

Through development of this GSP, a number of key data gaps have been identified in **Sections 3** through **5**. These data gaps were shared and discussed with Subbasin stakeholders to prioritize activities and actions needed to address the following data gaps:

- Amounts, locations, and depths of groundwater pumping (rural residential, agricultural, public water systems, commercial, and industrial)
- Role of faults within and along the boundaries of the Subbasin, particularly the Sebastopol Fault
- Interconnection of streams to the shallow aquifer system, including seasonal variability and how groundwater pumping and surface water diversions affect streamflow
- Basin boundary characteristics, such as the direction and magnitude of groundwater fluxes across Subbasin boundaries
- Aquifer hydraulic properties, recharge and discharge mechanisms, and volumes for both the shallow and deep aquifer systems
- Three-dimensional data gaps in the monitoring network for each primary aquifer

Studies and activities planned to address these identified data gaps within the initial 5 years of GSP implementation are identified in the following sections and categorized as either studies and information gathering or monitoring network improvements.

GSP Program Elements	First 20 Years of GSP Implementation																			
	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
GSP Submittal and State Review																				
GSP Submittal to DWR	★																			
DWR Review/Approval																				
Administration & Finance Program																				
Adminstrative/Governance Planning																				
Funding Program																				
Fee Study																				
Funding Mechanism Implementation																				
Fee Collection																				
Public Outreach & Coordination																				
Adaptive Management																				
Management Action Implementation																				
Study - Policy Options																				
Study - Recycled Water Opportunities Assessment																				
Study - Farm Plan Coordination																				
Implement Recommended Actions																				
Monitoring Program & Data Gaps																				
Implementation of Monitoring																				
Data Gap Filling						To be continued as-needed														
Model Updates and Refinements						To be continued as-needed														
Project Implementation																				
Group 1 Projects																				
Voluntary Conservation					To be continued as-needed															
Group 2 Projects																				
Stormwater Capture & Recharge - Site Investigations																				
Stormwater Capture & Recharge - Pilot																				
Stormwater Capture & Recharge - Project																				
Group 3 Projects																				
Aquifer Storage & Recovery (ASR) Feasibility Study Update																				
ASR Investigations and Pilot(1)																				
ASR Project Implementation(1)																				
Reporting																				
Annual Reports	★	★	★	★		★	★	★	★		★	★	★	★		★	★	★	★	
Five Year Evaluation/Updates					★					★					★					★

Notes:

DWR Review	
Milestone/Document Submittal	★
Planning, Desiign,Contruction Activity	
Implementation Activity	

1 Some projects, such as ASR, may be pursued on a more rapid pace by other entities involved with drought response.

7.2.4.1 Studies and Information Gathering

Planned studies and information gathering include the following activities.

Improve information on existing water wells and groundwater extraction. The objective of this task is to better assess the locations, depths, volumes, and timing of groundwater pumping from water-use sectors that have not historically measured and reported water use, such as rural residential, agricultural, commercial, and industrial. This will improve the assessment of potential impacts from groundwater pumping to beneficial users and uses within the Subbasin, including existing residential and other water wells and GDEs. The task will include the following activities, which will be performed within the initial 2 years of GSP implementation:

- Integration of parcel-specific information obtained through the planned well registration program with existing well log databases
- Assessment of available remote sensing data on actual ET to help constrain the estimates of groundwater demands for irrigation supplies

Aquifer system properties assessment: The objective of this task is to improve the understanding of the aquifer system hydrogeologic framework, distribution, and potential effects of faults on groundwater flow and basin boundary characteristics. Completion of this task will also improve the GSA's ability to assess potential impacts from groundwater pumping to beneficial users and uses within and along the boundaries of the Subbasin, including existing residential and other water wells and GDEs. As part of this task, the GSA will evaluate the airborne electromagnetic survey results (data collection and compilation funded by DWR) and incorporate them into the existing HCM. DWR is planning to collect geophysical data from the Subbasin through its airborne electromagnetic survey program in 2021 or 2022. Additional focused geophysical surveys to refine information in key areas (for example, areas identified for potential managed aquifer recharge projects) will also be considered.

Based on the data collection and evaluation described in this section, aquifer testing will be performed and evaluated at up to three locations. It is anticipated that the aquifer testing will be completed within the initial 3 years of GSP implementation. Wells for testing will be identified using the following criteria:

- Wells are owned by willing cooperators
- Wells have known well completion information
- Wellheads are completed such that water elevations in wells can be monitored with data loggers
- Wells are equipped with accurate flowmeters
- Wells have area or system for discharge of test water
- Preferred wells will have nearby wells that can be monitored during the test and will be located near key data gap areas, such as near interconnected surface water with nearby

shallow monitoring wells and along Subbasin boundaries (particularly the western and southern boundaries)

Interconnected surface water and GDE studies: As indicated in **Section 4.10.2.1**, in recognition of the significant information and data limitations and the importance of interconnected surface water to beneficial users within the Subbasin, the following studies and activities are planned:

- Develop improved information on the locations and amounts of surface water diversions under the jurisdiction of the SWRCB, including both direct diversions from streams and diversions that may occur from water wells near streams under riparian water rights. This information will be developed through the coordination process established between the GSA and SWRCB related to depletions of interconnected surface water.

- Perform studies that determine the impact of groundwater pumping on surface water depletion through a combination of differential stream gaging, tracer experiments, temperature profiling, and other methods.

- Assess the influence of groundwater pumping and groundwater levels on GDE health using available remote sensing tools and datasets. The GDE Pulse web app developed by TNC provides data on long-term temporal trends of vegetation metrics. This information will be integrated with available groundwater-level data and information to assess the relationship between groundwater conditions and GDEs. Conduct field visits as needed to verify the findings of the remote sensing assessment regarding GDE locations and health. The potential GDEs identified in this GSP will be field-verified to ensure that groundwater-dependent communities exist, and that the shallow groundwater is connected to regional aquifers that will be managed as part of this GSP.

- Compile and evaluate existing and relevant habitat field surveys that aid in understanding potential impacts of groundwater pumping on habitat associated with interconnected surface water.

To help prioritize and schedule these activities, the GSA will develop ongoing consultation with interested members of the GDE and ISW practitioner work groups to address these important data gaps within the Subbasin. It is anticipated that this consultation will be scheduled within the first 6 months of implementation.

7.2.4.2 Monitoring Network Improvements

Based on the assessment of data gaps in **Section 5**, the following activities for improving the monitoring networks are planned.

Refinement of Groundwater-level Monitoring Network: As described in **Section 5**, many of the identified data gaps in the Groundwater-level Monitoring Network are being addressed through new wells being constructed under the Proposition 68 grant. For remaining data gap areas, the GSA will evaluate both use of existing voluntary wells and construction of new dedicated monitoring wells. For the purposes of estimating costs, it is assumed that two new dedicated multi-level monitoring wells would be constructed for the Groundwater-level Monitoring

Network. The GSA intends to conduct outreach and expand the voluntary groundwater-level monitoring program in the Subbasin during GSP implementation.

Additionally, the GSA will work to improve data quality in groundwater-level monitoring networks by a combination of the following activities:

- Performing survey activities for wells that lack sufficient Reference Point vertical survey data, as funding becomes available
- Obtaining well construction information from well owners or by conducting investigations (that is, video logging) as funding or technical assistance becomes available
- Replacing wells in the monitoring network that have data quality issues with dedicated monitoring wells, as funding becomes available

Refinement of interconnected surface water monitoring network: Following completion of the interconnected surface water and GDE studies and information gathering as described, improvements to the interconnected surface water monitoring network will be developed. For the purposes of estimating costs, it is assumed that two new dedicated shallow aquifer system monitoring wells would be constructed for the interconnected surface water monitoring network between years 2 and 4 of GSP implementation. Additionally, it is assumed that remote sensing assessments of vegetation health will continue to be performed and reported at key intervals such as the 5-year GSP updates.

The 5-year costs of addressing data gaps are estimated to be from $750,000 to $1,250,000.

7.2.5 Maintaining, Updating, and Improvements to Model

The Subbasin groundwater model (SRPHM) informs the project and management activities and ongoing performance assessment of the SMC. Periodic updates to the groundwater model will be required to continue to refine and improve its capabilities and maintain ongoing functionality. This includes incorporating new model tools and features, updates to HCM, incorporating new monitoring data, and related work to support ongoing simulations of projects and management actions. Improvements will be focused on the initial 3 years of implementation to facilitate reassessing preliminary SMC, as appropriate, considering the appropriateness basin boundary representation in the model, and planning for any projects and actions. Model updates and refinements will be informed by data and information collected during early stages of implementation, including the planned activities for assessing data gaps described in **Section 7.2.4**. A detailed plan for model improvements and updates is provided in **Appendix 7-A**. The preliminary areas of focus identified for model updates and improvements include the following:

- Focused calibration of surface water and groundwater interaction
- Assessment of aquifer properties using data from planned airborne electromagnetic surveys, aquifer testing, and model testing

- Assessment of model boundary conditions, including locations and representation of simulated model boundaries with a focus on the western boundary where some of the larger areas of uncertainty currently exist
- Improvement of model estimates of groundwater pumping, including response to changing climate, impact of surface water diversions, and recycled water
- Update model predictive simulations to reflect new information on alternative future climate scenarios

The 5-year costs of performing updates and improvements to the model are estimated to be from $250,000 to $400,000.

7.2.6 Study and Implementation of Projects and Actions

To prevent potential undesirable results and to achieve MOs, projects and management actions are planned as part of GSP implementation. As described in **Section 6**, a portfolio of projects and management actions has been developed with the goal of addressing relevant sustainability indicators, including the circumstances under which they may be implemented.

The GSA plans to immediately begin implementation of selected projects and management actions. In some cases, initial implementation steps include performing studies or analyses to refine the concepts into actionable projects. Therefore, the initial activities for project implementation will include both initiation of Group 1 projects, and refining and planning for other projects and actions identified in **Section 6**. Studies and work efforts may include, but are not limited to, CEQA studies and documentation and engineering feasibility studies and preliminary design reports.

After necessary initial studies are completed, projects and management actions will undergo, as necessary, final engineering design (in the case of infrastructure projects) and public noticing and outreach, after which construction projects can occur followed by ongoing operations and maintenance.

The following activities related to projects and actions are planned during the first 5 years of implementation.

<u>Implementation of Group 1 Projects</u>:

- Assessment and implementation of conservation and groundwater-use efficiency opportunities. This project would include an assessment of groundwater-use characteristics, existing levels of water-use efficiency, and recommendations on preferred tools and strategies for implementation. While implementation of these projects is initially planned to be on a voluntary basis, the assessment will also identify specific metrics for evaluating the benefits of the projects and assess Subbasin conditions that may lead to mandatory implementation of demand management actions.

Planning and Potential Implementation of Group 2 Projects:

- Site-specific investigations and pilot study of On-Farm and other dispersed recharge opportunities, which will consider and include the following:
    - Water available for recharge
    - Areas with permeable near-surface deposits
    - Optimal methods and techniques
    - Outreach to interested landowners with locations that could help sustain baseflows/support GDEs for recharge

Planning and Potential Implementation of Group 3 Projects:

- Update 2013 Groundwater Banking Feasibility Study for other ASR opportunities including the following:
    - Update source water (Russian River) availability and transmission system capacity assumptions
    - Assess locations/operations that benefit GSP implementation (that is, areas of depletion)
    - Design and implement pilot studies for favorable areas
- Coordination and support for planning and implementation of ASR projects that may be developed and implemented by other project proponents on an accelerated timeframe in response to current drought conditions.

Management Actions:

- Coordination of Farm Plans developed at individual farm sites, with implementation of the basinwide GSP as follows:
    - Identify areas of mutual interest (for example, improved water-use efficiency, increased groundwater recharge, increased monitoring and data collection, coordinated information sharing, and reporting) in addition to challenges that need to be addressed (for example, data confidentiality, data quality requirements, verification of Farm Plan performance)
    - Identify requirements or standards to demonstrate benefits to GSP implementation, develop metrics that would be measured and verified, and consider options to incentivize actions of mutual benefit
- Assessment of additional recycled water opportunities including the following:
    - Optimization of existing and projected future available supplies
    - Cost/benefit analysis for future alignment options
    - Identification of optimal locations for future storage

- Study of potential policy options for future GSA consideration or recommendation. This study will prepare a prioritized list of potential policy options, including stronger demand management actions that may need to be adopted should the projects previously described in this section not be implementable or successful. The following initial list of potential policy options has been developed for potential inclusion in the assessment:
  - Water conservation plan requirements for new development
  - Discretionary review of well permits for any special areas identified in GSP
  - GSA review of discretionary projects that impact groundwater resources
  - Expansion of low-impact development or water efficient landscape plan requirements
  - Well construction and permitting recommendations (for example, water quality sampling/reporting for COCs, requirement for water-level measurement access, prevent cross-screening multiple aquifers)
  - Metering program
  - Development of a drinking water well mitigation program
  - Permitting and accounting of water hauling

This list represents initial ideas for policy options, which will be informed through continued stakeholder engagement and outreach. In particular, it is expected that as the GSA participates in future General Plan amendments and updates with the County, as required by SGMA, additional policy options may be developed and considered.

The estimated costs of refining and implementing these projects and actions are estimated to be from $320,000 to $790,000, as summarized in **Table 7-2**.

It is anticipated that the capital project costs within the initial 5 years will be paid for by some combination of individual project proponents/beneficiaries and grant funding. Specific details regarding roles of project proponents and the cost share mechanisms are anticipated to be determined as the projects are further defined and scoped. Therefore, costs associated with implementation of capital projects are not included in the GSP implementation budget estimate in **Table 7-2**.

Table 7-2. Summary of Estimated 5-year Costs for Projects and Management Actions, Excluding Capital Project Costs

Project/Action	Project Scenario Group	Estimated 5-year Costs	Other Potential Funding Sources	Assumptions
Conservation/Water-Use Efficiency/Alternate Water Sources	1	$75,000 to $110,000	Other GSAs	Some assessment costs shared by other GSAs
Stormwater Capture and Recharge	2	$80,000 to $230,000		

Project/Action	Project Scenario Group	Estimated 5-year Costs	Other Potential Funding Sources	Assumptions
Aquifer Storage and Recovery	3	$100,000 to $200,000	Other GSAs, Sonoma Water/Water Contractors	Other GSAs and Sonoma Water/Water Contractors will also contribute funding
Farm Plan Coordination		$20,000 to $60,000	Other GSAs	Other GSAs will also contribute funding
Recycled Water Assessment		$20,000 to $40,000	Water recyclers	
Policy Options		$25,000 to $120,000	Other GSAs/County	Other GSAs will also contribute funding for assessment of options
		$320,000 to $790,000 $550,000	Total Range Midrange	

It is also anticipated that each implemented project and management action will have its own set of monitoring objectives and data collection requirements to allow for evaluation and confirmation assessments, and, if necessary, modifications to improve effectiveness of the projects and management actions. The costs of specific projects that are not covered by beneficiaries/project proponents will include assumptions about financing the projects over time.

7.2.7 5-year Update to Groundwater Sustainability Plan

As required by SGMA regulations, an evaluation of the GSP and the progress toward meeting the approved SMC and the sustainability goal will occur at least every 5 years and with every amendment to the GSP. A written 5-year evaluation report (or periodic evaluation report) will be prepared and submitted to DWR. The information to be included in the evaluation reports is summarized as follows:

- A sustainability evaluation that contains a description of current groundwater conditions for each applicable sustainability indicator and that includes a discussion of overall sustainability in the Subbasin. Progress toward achieving interim milestones and MOs will be included, along with an evaluation of status relative to MTs. If interim milestones are not being achieved, the evaluation will identify obstacles to achieving the interim milestones. The evaluation will include a plan for overcoming those obstacles and provide a new assessment of interim milestones that achieve sustainability by 2042.

- An implementation plan progress section that describes the current status of project and management action implementation and whether any adaptive management actions have been implemented since the previous report. An updated project implementation schedule will be included, along with any new projects identified that support the sustainability goals of the GSP and a description of any projects that are no longer included in the GSP. Benefits of implemented projects and management actions will be described and updates on projects and management actions that are underway at the time of the report will be documented.

- GSP elements will be reconsidered as additional monitoring data are collected, land uses and community characteristics change, and GSP projects and management actions are implemented. It may become necessary to reconsider elements of this GSP and revise the GSP as appropriate. GSP elements to be reassessed may include basin setting, management areas, undesirable results, MTs, and MOs. If appropriate, a revised GSP, completed at the end of the 5-year evaluation period, will include revisions informed by findings from the monitoring program and changes in the Subbasin, including changes to groundwater uses, demands, or supplies, and results of project and management action implementation.

- A description of the monitoring network will be provided. An assessment of the monitoring network's function will be included, along with an analysis of data collected to date. If data gaps are identified, the GSP will be revised to include a method for addressing these data gaps, along with an implementation schedule for addressing gaps and a description of how the GSA will incorporate updated data into the GSP.

- New information available since the GSP adoption, last 5-year evaluation, or GSP amendment will be described and evaluated. New information warranting a change to the GSP will be included in the update.

- A summary of the regulations or ordinances related to the GSP that have been implemented by DWR or others since the previous report will be provided. The report will include a discussion of any required updates to the GSP.

- Legal or enforcement actions taken by the GSA in relation to the GSP will be summarized, including an explanation of how such actions support sustainability in the Subbasin.

- A description of amendments to the GSP will be provided in the 5-year evaluation report, including adopted amendments, recommended amendments for future updates, and amendments that are underway.

- Ongoing coordination will be required among the GSA; members of the Advisory Committee; other local, state, and federal partners; and the public. The 5-year evaluation report will describe coordination activities between these entities such as meetings, joint projects, data collection and sharing, and groundwater modeling efforts.

- Outreach activities associated with the GSP implementation, assessment, and GSP updates will be documented in the 5-year evaluation report.

The initial 5-year GSP evaluation is due to be submitted to DWR in 2027. The estimated cost of preparing the initial 5-year GSP update is estimated to be from $200,000 to $300,000.

7.2.8 Estimated 5-year Implementation Costs

The cost of the items described in **Sections 7.1.1** through **7.1.7** will vary from year to year but the average cost of implementation is approximately $1.2 million annually for the first 5 years (fiscal year 2022-2023 through fiscal year 2027-2028) for total costs of approximately $5.9 million, excluding the construction costs of specific capital projects, as summarized in **Table 7-3**.

To enhance efficiencies and provide similar benefits to nearby groundwater users in Sonoma Valley and Petaluma Valley GSAs, it is assumed that the development costs of common projects and actions will be shared among the three GSAs. In addition, the budget assumes that costs will be shared for the development of projects and actions conducted in cooperation with local, regional, and state partners (such as recycled water purveyors, water suppliers, RCDs, and others).

Table 7-3. Total Estimated 5-year Implementation Costs

	Year 1	Year 2	Year 3	Year 4	Year 5
GSP Implementation Item	**2022 to 2023**	**2023 to 2024**	**2024 to 2025**	**2025 to 2026**	**2026 to 2027**
GSA Administration & Operations	$285,000	$255,000	$250,000	$240,000	$255,000
Communication & Stakeholder Engagement[a]	$120,000	$95,000	$95,000	$95,000	$110,000
Annual Monitoring, Evaluation & Reporting	$275,000	$220,000	$220,000	$220,000	$220,000
Data Gap Filling[a]	$100,000	$355,000	$551,000	$290,000	$0
Conceptual Projects & Planning Design[a]	$80,000	$165,000	$265,000	$20,000	$20,000
Model Updates[a]	$50,000	$150,000	$75,000	$50,000	$25,000
5-year GSP Updates[a]	$0	$0	$0	$100,000	$200,000
Subtotal	$910,000	$1,240,000	$1,456,000	$1,015,000	$830,000
10 percent Contingency - rounded to nearest $5,000	$90,000	$125,000	$145,000	$100,000	$85,000
Total	$1,001,000	$1,364,000	$1,601,600	$1,116,500	$913,000

[a] Potential for bond funding/technical services support

Notes:

Preliminary average annual costs are equal to approximately $1.2 million.

Estimates of future implementation costs (Years 6 through 10) will be provided in the 5-year GSP update.

7.3 Funding

Development of this GSP was partially funded through grants from DWR through the Water Quality, Supply, and Infrastructure Improvement Act of 2014 (Proposition 1) and the California Drought, Water, Parks, Climate, Coastal Protection, and Outdoor Access for All Act of 2018 (Proposition 68). Additional support was provided through DWR Technical Support Services program, which included the drilling of 12 shallow monitoring wells. GSA member agencies, as described in **Section 1.3.1**, funded the remainder of the GSP development and GSA administration through a fee based on groundwater pumping and/or member-agency contributions. The grant funding ends after submittal of this GSP. The current fee will be reassessed and member-agency funding commitments will end on June 30, 2022. Therefore, additional funding streams are needed for GSP implementation.

GSP implementation will partially be funded by an implementation fee that is the current subject of an ongoing fee study. Other potential funding sources include grants through DWR, SWRCB, and federal and local entities; DWR technical support; and partnerships with member agencies, other GSAs and entities interested in leveraging mutually beneficial programs, projects, and studies.

7.3.1 Fees, Grants, and Other Funding Sources

SGMA provides GSAs the authority to impose certain fees, including groundwater pumping fees. In September 2021, the GSA engaged a consultant, SCI Consulting, to conduct a fee study to evaluate and provide recommendations for GSP implementation funding. The study will build on the work done in a previous fee study adopted by the GSA Board in 2019. The new study will include outreach and education to inform and solicit feedback from groundwater users and other stakeholders. Any imposition of a fee, tax, or charge will comply with California law and all applicable Constitutional requirements, based on the nature of the fee.

The fee will be designed to pay for the costs of implementing the GSP that will not be covered by grants, low-interest financing, project beneficiaries and project partners. An implementation budget provided in **Table 7-3** provides a high-level overview of costs, and indicates items that could be eligible for grant funding. Administrative and operational costs are generally not eligible for grants or loans, but the remainder of the items listed in the budget (with the exception of contingency funds) may be partially or fully eligible for grant funding, depending on the grant source and availability. The GSA has successfully applied for and received more than $2.2 million in grant funding and technical support services, and will continue to pursue grants and low-interest financing to offset the costs of monitoring, filling data gaps, and for planning and implementing projects and actions.

In addition, funding could be provided by project partners (such as other agencies) or project beneficiaries (such as farmers, businesses, and nearby groundwater users) who directly benefit from project implementation.

A more detailed budget will be developed as part of the fee study process and will be available in Winter 2022. The GSA Board will consider adoption of the implementation fee in Spring 2022, and fee collection is anticipated to begin in December 2022.

7.4 Schedule

The implementation schedule is on **Figure 7-1.** The final GSP will be submitted to DWR no later than January 31, 2022. While DWR has 2 years to review the GSP, the schedule on **Figure 7-1** assumes that implementation begins immediately, and provides an overview of the preliminary schedule for agency administration and finance, monitoring, project implementation, and reporting. Many of these categories consist of ongoing tasks and efforts that will continue throughout GSP implementation.

Administration and finance presented on **Figure 7-1** includes completion and implementation of the fee study and outreach and communication. The task also includes studies and implementation of management actions, including Farm Plan Coordination, assessment of additional recycled water opportunities, and development of the policy options (described in **Section 7.2.6**).

The monitoring program and data gap task includes collecting and analyzing data from existing and future RMPs, and planning for new monitoring sites to fill the data gaps discussed in **Section 5**.

The project implementation schedule includes the development and implementation of Group 1, Group 2, and Group 3 projects, as described in **Section 6**. After a short planning period, it is assumed that Group 1 project implementation will begin in 2023. Group 2 and 3 projects require permitting, environmental analysis, and engineering design, which would begin in 2022. Depending upon results of pilot studies, planned to be initiated in 2024, full-scale implementation of Group 2 and 3 projects is anticipated to begin in 2028. The timing of projects is based on best estimates and may shift as GSP implementation proceeds based upon the needs at the time. Additionally, some projects, such as ASR, may be pursued on a more rapid pace by other entities involved with drought response.

The implementation of the management actions (coordination of Farm Plans with GSP implementation, assessment of recycled water opportunities, assessment and prioritization of potential policy options) and will be initiated in the first year of implementation with the goal of having initial recommendations on scope and prioritization for the GSA Board to consider within the first 2 years of implementation.

GSP reporting will occur on an annual and a 5-year basis as required under SGMA. Annual reports will be submitted to DWR by April 1 of each year. Periodic reports (every 5 years or following substantial GSP amendments) will be submitted to DWR by April 1 at least every 5 years (2027, 2032, 2037, and 2042). The contents of annual and periodic reports are described in **Section 7.2**.

Section 8: References

Groundwater Sustainability Plan for
Santa Rosa Plain Groundwater Subbasin

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8 REFERENCES

8.1 Works Cited

Allen, J.R. 2003. Stratigraphy and Tectonics of Neogene strata, Northern San Francisco Bay Area. Master's thesis, San Jose State University. 183 p. https://scholarworks.sjsu.edu/etd_theses/2388/

Alley, William M., Thomas E. Reilly, and O. Lehn Franke. 1999. *Sustainability of Ground-Water Resources*. U.S. Geological Survey Circular 1186. https://pubs.er.usgs.gov/publication/cir1186

Barlow, P.M., and S.A. Leake. 2012. *Streamflow Depletion by Wells—Understanding and Managing the Effects of Groundwater Pumping on Streamflow*. U.S. Geological Survey Circular 1376. http://pubs.usgs/circ/1376.

Bennett, G.L., and M.S. Fram. 2014. *Groundwater-quality Data in the North San Francisco Bay Shallow Aquifer Study Unit, 2012: Results from the California GAMA Program*. U.S. Geological Survey Data Series 865. https://pubs.usgs.gov/ds/0865/pdf/ds865.pdf

Borsa, A. A., D.C. Agnew, and D.R. Cayan. 2014. "Ongoing Drought-Induced Uplift in the Western United States." *Science.* Vol. 345, pp. 1587-90.

Brunner P., Cook P. G., and C. T. Simmons. 2011. "Disconnected Surface Water and Groundwater: From Theory to Practice." *Ground Water*. Vol. 49. 460-7. doi: 10.1111/j.1745-6584.2010.00752.x. https://www.researchgate.net/publication/46303663_Disconnected_Surface_Water_and_Groundwater_From_Theory_to_Practice

California Department of Water Resources (DWR). 1979. *Meeting Water Demands in the City of Rohnert Park*.

California Department of Water Resources (DWR). 1982. *Evaluation of Ground Water Resources, Sonoma County. Volume 2. Santa Rosa Plain.* Bulletin 118-4.

California Department of Water Resources (DWR). 2003. *California's Groundwater*. DWR Bulletin 118 Update 2003. https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Bulletin-118/Files/Statewide-Reports/Bulletin_118_Update_2003.pdf

California Department of Water Resources (DWR). 2012. *2012 Sonoma County Land Use Survey Data*. https://data.cnra.ca.gov/dataset/sonoma-county-land-use-survey-2012

California Department of Water Resources (DWR). 2016a. *California's Groundwater, Working Towards Sustainability*. Bulletin 118 Interim Update 2016.

California Department of Water Resources (DWR). 2016b. *Best Management Practices for the Sustainable Management of Groundwater, Monitoring Protocols, Standards, and Sites*.

December. https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/BMP-1-Monitoring-Protocols-Standards-and-Sites_ay_19.pdf.

California Department of Water Resources (DWR). 2016c. *Best Management Practices for the Sustainable Management of Groundwater, Monitoring Networks and Identification of Data Gaps*. December. https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/BMP-2-Monitoring-Networks-and-Identification-of-Data-Gaps_ay_19.pdf.

California Department of Water Resources (DWR). 2017. *Best Management Practices for the Sustainable Management of Groundwater, Draft Sustainable Management Criteria.* November. https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/BMP-6-Sustainable-Management-Criteria-DRAFT_ay_19.pdf.

California Department of Water Resources (DWR). 2020. *Sustainable Groundwater Management Act 2019 Basin Prioritization, Process and Results*. May.

California Department of Water Resources (DWR). 2021a. DAC Mapping Tool. https://gis.water.ca.gov/app/dacs.

California Department of Water Resources (DWR). 2021b. *InSAR Data Accuracy for California Groundwater Basins, CGPS Data Comparative Analysis, January 2015 to October 2020.* Final Report. Prepared by Towill, Inc. April 7. . https://data.cnra.ca.gov/dataset/tre-altamira-insar-subsidence/resource/a1949b59-2435-4e5d-bb29-7a8d432454f5

California Department of Water Resources (DWR). 2021c. California Irrigation Management Information System. https://cimis.water.ca.gov/.

California Sustainable Winegrowing Alliance. 2020. *California Code of Sustainable Winegrowing Workbook, 4th Edition*. December. https://www.sustainablewinegrowing.org/swpworkbook.php.

Cardwell, G.T. 1958. *Geology and Ground water in the Santa Rosa and Petaluma Areas, Sonoma County, California*. U.S. Geological Survey Water Supply Paper 1427. https://pubs.er.usgs.gov/publication/wsp1427

Center for Ecosystem Management and Restoration (CEMAR). 2014. *Report on the Hydrologic Characteristics of Mark West Creek*. Updated January 28, 2015. http://www.cemar.org/pdf/Report_on_the_Hydrologic_Characteristics_of_Mark_West_Creek.pdf

City of Cotati. 2011. *Water Distribution System Master Plan*. Prepared by Carollo. September. http://www.cotaticity.org/common/pages/DisplayFile.aspx?itemId=15730782

City of Cotati. 2015. *Cotati General Plan*. Prepared by DeNovo Planning Group. Adopted March 24, 2015.
http://cotati.generalplan.org/sites/default/files/Cotati%20General%20Plan_Adopted_Final_3-24-15_0.pdf

City of Rohnert Park. 2000*. Our Place … Rohnert Park 2020: A Plan for the Future, General Plan*. Eighth Edition. Prepared by Dyett & Bhatia. Adopted July 2000.
https://p1cdn4static.civiclive.com/UserFiles/Servers/Server_3037789/File/Planning/General%20Plan%20and%20Specific%20Plans/General%20Plan%202020/8th%20Edition%20_%20Final%20PDF.pdf

City of Rohnert Park. 2007. *2005 Urban Water Management Plan.* Prepared by Winzler and Kelly Consulting Engineers with Luhdorff and Scalmanini Consulting Engineers, Brown and Caldwell, and Maddaus Water Management. Rohnert Park, California.
https://p1cdn4static.civiclive.com/UserFiles/Servers/Server_3037789/File/Engineering/WaterSupplyDocumentation/UWMP_2005_Final_2007-08-28.pdf

City of Santa Rosa. 2009. *Santa Rosa General Plan 2035*. Adopted November 3, 2009.
https://srcity.org/DocumentCenter/View/10675/Santa-Rosa-General-Plan-2035-PDF

City of Santa Rosa. 2013a. *Santa Rosa Plain Salt and Nutrient Management Plan*. Prepared by Woodard & Curran in association with Plan Tierra. March.
https://srcity.org/DocumentCenter/View/15217/Salt-and-Nutrient-Management-Plan

City of Santa Rosa. 2013b. *Municipal Operations Climate Action Plan*. August 6.
https://srcity.org/DocumentCenter/View/13836/Climate-Action---2013-Municipal-Operations-Plan

City of Santa Rosa. 2013c. *Groundwater Master Plan*. Final Report. September.
https://srcity.org/DocumentCenter/View/15711/Groundwater-Master-Plan

City of Santa Rosa. 2014. *Water Master Plan Update*. August.
https://srcity.org/DocumentCenter/View/13829/Water---2014-Master-Plan

City of Santa Rosa. 2021. *Santa Rosa Plain Groundwater Subbasin Revised Monitoring and Reporting Program*. (As submitted to the Regional Board, not yet approved.) Prepared by Woodard & Curran. August.

City of Santa Rosa and County of Sonoma. 2011. *Storm Water Low Impact Development Technical Design Manual*. August. https://srcity.org/DocumentCenter/View/8942/Low-Impact-Development-Technical-Design-Manual-PDF

City of Sebastopol. 2005. *Sebastopol Water Master Plan*. Prepared by Coastland Civil Engineering for City of Sebastopol. September. https://www.ci.sebastopol.ca.us/SebastopolSite/media/Documents/water_swer_utility/final_water_master_plan_report_07-10-(1)_1.pdf?ext=.pdf

City of Sebastopol. 2016. *Sebastopol General Plan*. Prepared by De Novo Consulting Group. Adopted November 15, 2016. https://ci.sebastopol.ca.us/getattachment/10408047-71e8-473e-b804-e51ed2e9b187/Adopted_GeneralPlan_11-15-16.pdf.aspx?lang=en-US&ext=.pdf

Climate Change Technical Advisory Group (CCTAG). 2015. *Perspectives and Guidance for Climate Change Analysis*. Sacramento. California Department of Water Resources. https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/All-Programs/Climate-Change-Program/Climate-Program-Activities/Files/Reports/Perspectives-Guidance-Climate-Change-Analysis.pdf

Community Collaborative Rain, Hail and Snow Network (CoCoRaHS). 2021. "Sonoma County, California Daily Precipitation Reports." View Data: Daily Precipitation Reports by County. https://www.cocorahs.org/ViewData/CountyDailyPrecipReports.aspx?state=CA&county=SN.

County of Sonoma Department of Health Services. 2014. A Portrait of Sonoma County, Sonoma County Human Development Report. May. http://ssrc-static.s3.amazonaws.com/wp-content/uploads/2015/08/05141006/English_Complete_POSC.pdf

Craig, Harmon. 1961. "Isotopic variations in meteoric waters." *Science*. Vol. 133, pp. 1702-1703.

Dettinger, M.D., F.M. Ralph, D. Tapash, P.J. Nieman, and D.R. Cayan. 2011. "Atmospheric Rivers, Floods and Water Resources of California." *Water*. Special Issue: Managing Water Resources and Development in a Changing Climate. March. https://www.mdpi.com/2073-4441/3/2/445/htm

Ford, R.S. 1975. *Evaluation of ground water resources: Sonoma County, volume 1: geologic and hydrologic data*. California Department of Water Resources Bulletin 118-4.

Freeze, R.A. and J.A. Cherry. 1979. *Groundwater*. Englewood Cliffs, NJ: Prentice-Hall, Inc. https://www.un-igrac.org/sites/default/files/resources/files/Groundwater%20book%20-%20English.pdf

Funning, G. J., R. Burgmann, A. Ferretti, F. Novali, and A. Fumagalli. 2007. "Creep in the Rodgers Creek Fault, Northern San Francisco Bay Area From a 10 Year PS-InSAR Dataset." *Geophysical Research Letters*. Vol. 34. L19306. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.210.8758&rep=rep1&type=pdf

GEI Consultants, Inc., Pueblo Water Resources, and Parker Groundwater. 2013. *Santa Rosa Plain/Sonoma Valley Groundwater Banking Feasibility Study*. https://evogov.s3.amazonaws.com/185/media/182081.pdf

GEI Consultants, Inc., Pueblo Water Resources, and Sonoma Water. 2020. *Technical Addendum: ASR Pilot Testing at TW-6A*. March. https://www.sonomawater.org/media/PDF/Water%20Resources/Groundwater/Groundwater%20Banking/ASR%20Pilot%20Test%20Report%20-%20Final0320.pdf

Geological Society of America. 2018. GSA Geologic Time Scale v. 5.0. https://doi.org/10.1130/2018.CTS005R3C.

He, M., A. Schwarz, E. Lynn, and M. Anderson. 2018. "Projected Changes in Precipitation, Temperature, and Drought across California's Hydrologic Regions in the 21st Century." *Climate.* Vol. 6, No. 2. California Department of Water Resources. https://doi.org/10.3390/cli6020031.

Heath, Ralph C. 1984. *Basic Ground-Water Hydrology*. U.S. Geological Survey Water-Supply Paper 2220. Prepared in cooperation with the North Carolina Department of Natural Resources and Community Development. https://pubs.er.usgs.gov/publication/wsp2220

Holland, P., R. Rubin, J. Wakabayashi, and J. Allen. 2009. *Geology along the Rodgers Creek and Tolay faults: Late Cenozoic stratigraphy and tectonics, Franciscan melange and high grade metamorphism, and Quaternary landslide complexes*. Association of Engineering Geologists, San Francisco Section Field Trip guide. May. http://cei.sonoma.edu/sites/cei/files/images/geology_of_sonoma_mountain_and_sonoma_county_guidebook.pdf

Intergovernmental Panel on Climate Change (IPCC). 2013. *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. T.F. Stocker, D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex, and P.M. Midgley, eds. Cambridge, United Kingdom and New York, New York: Cambridge University Press. https://www.ipcc.ch/report/ar5/wg1/

Jin, L., and G.J. Funning. 2017. Testing the inference of creep on the northern Rodgers Creek fault, California, using ascending and descending persistent scatterer InSAR data. *Journal of Geophysical Research. Solid Earth.* https://agupubs.onlinelibrary.wiley.com/doi/full/10.1002/2016JB013535

Kulongoski, J.T., Kenneth Belitz, and B.J. Dawson. 2006. *Ground-water quality data in the North San Francisco Bay hydrologic provinces, California, 2004: Results from the California (GAMA) Program*. U.S. Geological Survey Data Series Report 167, p. 100. https://pubs.usgs.gov/ds/ds167/

Kulongoski, J.T., K. Belitz, M.K. Landon, and C. Farrar. 2010. *Status and Understanding of Groundwater Quality in the North San Francisco Bay Groundwater Basins, 2004: California GAMA Priority Basin Project*. U.S. Geological Survey Scientific Investigations Report 2010-5089. https://pubs.usgs.gov/sir/2010/5089/

Langenheim, V.E., C.W. Roberts, C.A. McCabe, D.K. McPhee, J.E. Tilden, and R.C. Jachens. 2006. *Preliminary isostatic gravity map of the Sonoma Volcanic Field and vicinity, Sonoma and Napa Counties, California*. U.S. Geological Survey Open File Rep. 06-1056. https://pubs.usgs.gov/of/2006/1056/

Langenheim, V.E., R.W. Graymer, R.C. Jachens, R.J. Mclaughlin, D.L. Wagner, and D.S. Sweetkind. 2010. "Geophysical framework of the northern San Francisco Bay region, California." *Geosphere.* Vol. 6, No. 5, pp. 594–620.

Leidy, R.A., G. Becker, and B.N. Harvey. 2005. "Historical Status of Coho Salmon in Streams of the Urbanized San Francisco Estuary*." California Fish and Game*. Vol. 91, No. 4. pp. 219-254. http://www.cemar.org/pdf/coho.pdf

Loaiciga, H. 2016. "The Safe Yield and Climatic Variability: Implications for Groundwater Management." *Groundwater*. Vol. 55, pp. 334-345. **https://doi.org/10.1111/gwat.12481**

Martin, P., L.F. Metzger, J.N. Densmore, and R.A. Schroeder. 2013. "Groundwater quality and source and age of groundwater in the Santa Rosa Plain watershed, Sonoma County, California." *Hydrogeologic and geochemical characterization of the Santa Rosa Plain watershed, Sonoma County*. Tracy Nishikawa, ed. U.S. Geological Survey Scientific Investigations Report 2013-5118, pp. 113-165. https://pubs.usgs.gov/sir/2013/5118/pdf/sir20135118.pdf

McLaughlin, R.J., V.E. Langenheim, A.M. Sarna-Wojcicki, R.J. Fleck, D.K. McPhee, C.W. Roberts, C.A. McCabe, and Elmir Wan. 2008. *Geologic and Geophysical Framework of the Santa Rosa 7.5' Quadrangle, Sonoma County, California*. U.S. Geological Survey Open-File Report 2008–1009. http://pubs.usgs.gov/of/2008/1009/. https://pubs.usgs.gov/of/2008/1009/

McPhee, D. K., V.E. Langenheim, and R.C. Jachens. 2007. "Basin structure beneath the Santa Rosa Plain, Northern California. Implications for damage caused by the 1969 Santa Rosa and 1906 San Francisco earthquakes." *Bulletin of the Seismological Society of America*. https://www.researchgate.net/publication/250074837_Basin_Structure_beneath_the_Santa_Rosa_Plain_Northern_California_Implications_for_Damage_Caused_by_the_1969_Santa_Rosa_and_1906_San_Francisco_Earthquakes

Muir, K.S., and M.J. Johnson. 1979. *Classification of Groundwater Potential in Three Parts of Santa Cruz County*. U. S. Geological Survey Open File Report 79-1065.

Muir, K.S., and T.B. Coplen. 1981. *Tracing Ground-water Movement By Using the Stable Isotopes of Oxygen and Hydrogen, Upper Penitencia Creek Alluvial Fan, Santa Clara Valley, California.* U.S. Geological Survey Water-Supply Paper 2075. https://pubs.usgs.gov/wsp/2075/report.pdf

Nishikawa, Tracy, ed. 2013. *Hydrogeologic and Geochemical Characterization of the Santa Rosa Plain Watershed, Sonoma County, California.* U.S. Geological Survey Scientific Investigations Report 2013-5118. https://pubs.usgs.gov/sir/2013/5118/

Nishikawa, T., J.A. Hevesi, D.S. Sweetkind, and L.R. Woolfenden. 2013a. "Introduction to Study Area." Chapter A in Hydrogeologic and Geochemical Characterization of the Santa Rosa Plain Watershed, Sonoma County. Tracy Nishikawa, e8-d7. U.S. Geological Survey Scientific Investigations Report 2013-5118. https://pubs.usgs.gov/sir/2013/5118/

Nishikawa, T., J.A. Hevesi, D.S. Sweetkind, and P. Martin. 2013b. "Conceptual Model of Santa Rosa Plain Watershed Hydrologic System." *Hydrogeologic and Geochemical Characterization of the Santa Rosa Plain Watershed, Sonoma County*. Tracy Nishikawa, ed. U.S. Geological Survey Scientific Investigations Report 2013-5118. pp. 167-177. https://pubs.usgs.gov/sir/2013/5118/

North Coast Regional Water Quality Control Board (NCRWQCB). 2018. *Water Quality Control Plan for the North Coast Region*. June. https://www.waterboards.ca.gov/northcoast/water_issues/programs/basin_plan/basin_plan_d ocuments/

Pavley. 2014. *Senate Bill 985, Stormwater Resource Planning Act.* Chapter 555. September 25. https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201320140SB985

Permit and Resource Management Department (Permit Sonoma). 2016. Groundwater Availability Classifications map. https://sonomacounty.ca.gov/PRMD/Administration/GIS/Map-Gallery/.

Peterson D.M. and J.L. Wilson 1988. *Variably saturated flow between streams and aquifers*. Tech Completion Rep 233, New Mexico Water Resources Research Institute, Socorro. https://nmwrri.nmsu.edu/tr233/

Powell, C.L., II, J.R. Allen, and P.J. Holland. 2004. *Invertebrate paleontology of the Wilson Grove Formation (late Miocene to late Pliocene), Sonoma and Marin Counties, California, with some observations on its stratigraphy, thickness, and structure.* U.S. Geological Survey Open-File Report 2004–1017. 105 p. http://pubs.usgs.gov/of/2004/1017.

Rohde, M.M., B. Seapy, R. Rogers, X. Castañeda, eds. 2019. *Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management*. The Nature Conservancy. San Francisco, California. https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.p df

Russian River Watershed Association. 2018. *Russian River Storm Water Resource Plan*. Final Report. July. http://www.rrwatershed.org/project/stormwater-resource-plan/

Santa Rosa Plain Basin Advisory Panel. 2014*. Santa Rosa Plain Watershed Groundwater Management Plan*. Prepared by Parker Groundwater. http://santarosaplaingroundwater.org/wp-content/uploads/SRP_GMP_12-14.pdf.

Santa Rosa Plain Groundwater Management Program (SRPGMP). 2017. *2016 Annual Report*. Santa Rosa Plain Watershed Groundwater Management Program. Prepared by Sonoma Water. http://santarosaplaingroundwater.org/wp-content/uploads/SRPGMP-FINAL-2016-Annual-Report.pdf

Santa Rosa Plain Groundwater Sustainability Agency (Santa Rosa Plain GSA). 2018. *Community Engagement Plan for Development and Adoption of a Groundwater Sustainability Plan.* January. http://santarosaplaingroundwater.org/wp-content/uploads/Community-Engagement-Plan.pdf

Sesser B., D. DiPietro, R. Lawson, and M. Trotta. 2011. *Sonoma Valley Groundwater Potential Recharge Mapping Project*. https://sonomaecologycenter.org/wp-content/uploads/2021/02/Sonoma_Valley_GWR_Final_Report.pdf

Simley J.D., and W.J. Carswell, Jr. 2009. *The National Map—Hydrography*. U.S. Geological Survey Fact Sheet 2009-3054. http://pubs.usgs.gov/fs/2009/3054/pdf/FS2009-3054.pdf.

Sloop, Christina, J. Honton, C. Greager, L. Chen, E.S. Andrews, and S. Bozkurt. 2007. "Hydrology and sedimentation." *The Altered Laguna: A Conceptual Model of Watershed Stewardship*. Laguna de Santa Rosa Foundation. https://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/laguna_de_santa_rosa/pdf/170125/Sloopetal2007_Combined.pdf

Sonoma County. 2003. *Pilot Study of Groundwater Conditions in the Joy Road, Mark West Springs, and Bennett Valley Areas of Sonoma County, California*. Prepared by Kleinfelder, Inc.

Sonoma County. 2008. *Sonoma County General Plan*. Adopted by Resolution No. 08-0808 of the Sonoma County Board of Supervisors, September 23, 2008. Amended by Resolution No. 16-0283 on August 2, 2016. https://sonomacounty.ca.gov/PRMD/Long-Range-Plans/General-Plan.

Sonoma County Regional Climate Protection Authority. 2016. *Climate Action 2020 and Beyond: Sonoma County Regional Climate Action Plan*. https://rcpa.ca.gov/wp-content/uploads/2016/07/CA2020_Plan_7-7-16_web.pdf.

The Sonoma Resource Conservation District and the Resource Conservation District of Santa Cruz County (Sonoma RCD). 2015. *Slow it. Spread it. Sink it. Store it!: Guide to Beneficial Stormwater Management and Water Conservation Strategies*. Second edition. June. http://sonomarcd.org/wp-content/uploads/2017/06/Slow-it-Spread-it-Sink-it-Store-it.pdf.

Sonoma County Transportation Authority (SCTA). 2017. *Priority Development Area Investment and Growth Strategy Update*. Adopted June 12. http://scta.ca.gov/wp-content/uploads/2017/05/PDA-IGS-2017-update.pdf

Sonoma Veg Map. 2013. Sonoma County Vegetation Mapping & LIDAR Program: High-Quality Data for Planning, Conservation and Resource Management. A joint project of Sonoma County Agricultural Preservation and Open Space District and Sonoma Water. http://sonomavegmap.org/data-downloads.

Sonoma County Water Agency (Sonoma Water). 2012. *Laguna-Mark West Creek Watershed Planning Scoping Study Screening Technical Memorandum*. Prepared by Winzler-Kelly-GHD for Sonoma Water. May 2012. https://www.sonomawater.org/stormwater-groundwater.

Sonoma County Water Agency (Sonoma Water). 2013. *Water Smart Development Guidebook*. https://evogov.s3.amazonaws.com/media/185/media/165407.pdf.

Sonoma County Water Agency (Sonoma Water). 2018. *2018 Water Supply Strategies Action Plan.* https://www.sonomawater.org/water-supply-strategy.

Sonoma County Water Agency (Sonoma Water). 2021. *2020 Urban Water Management Plan*. Prepared by Brown and Caldwell. June. https://www.sonomawater.org/media/PDF/Water%20Resources/Water%20Supply/UWMP/Sonoma%20Water%202020%20UWMP_June%202021-ADA.pdf

Sonoma County Water Agency (Sonoma Water) and University of California Cooperative Extension/California Sea Grant. 2014. *Implementation of the California Coastal Salmonid Monitoring Plan in the Russian River.* June. https://www.sonomawater.org/media/PDF/Environment/Fisheries/reports/cmp-report-2019_ADA.pdf

Sophocleous, M. 2002. "Interactions between groundwater and surface water. The state of the science." *Hydrogeology Journal*. Vol. 10. pp. 52–67.

Sowers, J.M., J.S. Noller, and W.R. Lettis. 1998. *Quaternary Geology and Liquefaction Susceptibility, Napa, California 1:100,000 Quadrangle: A Digital Database*. U.S. Geological Survey Open-File Report 98–460. https://pubs.er.usgs.gov/publication/ofr98460

State Water Resources Control Board (SWCRB). 1986. *Russian River Project Decision 1610: Application 19351 and Petitions on Permits 1297A, 12949, 12950, and 16596; Issued on Applications 12919A, 15736, 15737, and 19351 of Sonoma County Water Agency; East Fork Russian River, Russian River, and Dry Creek in Mendocino and Sonoma Counties*. April. https://www.waterboards.ca.gov/waterrights/board_decisions/adopted_orders/decisions/d1600_d1649/wrd1610.pdf

State Water Resources Control Board (SWCRB). 2012. *Addressing Nitrate in California's Drinking Water*. Prepared by University of California, Davis for SWRCB. March. https://watershed.ucdavis.edu/project/addressing-nitrate-california%27s-drinking-water

State Water Resources Control Board (SWRCB). 2018. *Water Quality Control Policy for Recycled Water*. December. https://www.waterboards.ca.gov/board_decisions/adopted_orders/resolutions/2018/121118_7_final_amendment_oal.pdf.

State Water Resources Control Board (SWRCB). 2021. GeoTracker database. CA.gov. Accessed April 24, 2020. https://geotracker.waterboards.ca.gov.

Sweetkind, D.S., J.A. Hevesi, T. Nishikawa, P. Martin, and C.D. Farrar. 2013. "Hydrology of the Santa Rosa Plain Watershed, Sonoma County, California." Chapter B. In Nishikawa, Tracy, ed., *Hydrogeologic and geochemical characterization of the Santa Rosa Plain watershed, Sonoma*

County, California. U.S. Geological Survey Scientific Investigations Report 2013-5118, pp. 27-112. https://pubs.usgs.gov/sir/2013/5118/

The Nature Conservancy (TNC). 2018. *Groundwater Dependent Ecosystems under the Sustainable Groundwater Management Act: Guidance for Preparing Groundwater Sustainability Plans*. January. https://groundwaterresourcehub.org/public/uploads/pdfs/GWR_Hub_GDE_Guidance_Doc_2-1-18.pdf.

Todd Engineers. 2012. *Memorandum: Santa Rosa Plain Groundwater Recharge Potential Mapping*.

Town of Windsor. 2011. *Town of Windsor Master Plan Update*. Prepared by Woodard & Curran. September. https://www.townofwindsor.com/DocumentCenter/View/13588/Windsor_Final-WMP-Update_090711?bidId=

Town of Windsor. 2018. *Town of Windsor General Plan*. Prepared by Mintier Harnish. Adopted April 4, 2018. https://www.townofwindsor.com/DocumentCenter/View/21498/Final-Town-of-Windsor-2040-General-Plan_2018-06-04

U.S. Department of Agriculture (USDA). 2007. SSURGO database for Sonoma County, California. Natural Resources Conservation Service. Accessed May 14, 2009. https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm.

U.S. Geological Survey (USGS). 2006. National Hydrography dataset. Accessed May 1, 2020. http://nhd.usgs.gov.

U.S. Geological Survey (USGS). 2014. *Water Quality in Principal Aquifers of the United States, 1991-2010.* National Water-Quality Assessment Program. Circular 1360. https://pubs.usgs.gov/circ/1360/

U.S. Geological Survey (USGS). 2021. "USGS Water Data for the Nation." National Water Information System: Web Interface database. https://waterdata.usgs.gov/nwis.

Wagner, D.L., G.J. Saucedo, K.B. Clahan, R.J. Fleck, V.E. Langenheim, R.J. McLaughlin, A.M. Sarna-Wojcicki, J.R. Allen, and A.L. Deino. 2011. "Geology, Geochronology, and Paleogeography of the Southern Sonoma Volcanic Field and Adjacent Areas, Northern San Francisco Bay Region, California." *Geosphere*. Vol. 7, pp. 658–683. https://pubs.geoscienceworld.org/gsa/geosphere/article/7/3/658/132452/Geology-geochronology-and-paleogeography-of-the

Wagner, D.L., and C.I. Gutierrez. 2017. *Preliminary Geologic Map of the Napa and Bodega Bay 30'x 60' Quadrangles, California* [map]. 1:100,000. California Geological Survey. Accessed April 8, 2021. https://ngmdb.usgs.gov/Prodesc/proddesc_105819.htm.

WATER Institute. 2008. *Roof Water Harvesting for a Low Impact Water Supply, Featuring the Brazilian Ball Pre-Filter System: A Case Study*. https://oaec.org/publications/roof-water-harvesting-for-a-low-impact-water-supply.

Watt, J., D. Ponce, T. Parsons, and P. Hart. 2016. "Missing link between the Hayward and Rodgers Creek Faults." *Science Advances*. Vol. 2. October 5. https://www.science.org/doi/full/10.1126/sciadv.1601441

Winters, T.C., J.W. Harvey, O.L Franke, and W.M. Alley. 1999. *Ground Water and Surface Water: A Single Resource*. U. S. Geological Survey Circular 1139. https://pubs.usgs.gov/circ/1998/1139/report.pdf

Woolfenden, L.R., and T. Nishikawa, eds. 2014. *Simulation of groundwater and surface-water resources of the Santa Rosa Plain watershed, Sonoma County, California*. U.S. Geological Survey Scientific Investigations Report 2014-5052. https://pubs.usgs.gov/sir/2014/5052/pdf/sir2014-5052.pdf.

8.2 Santa Rosa Plain GIS Data Sources

Bureau of Indian Affairs - California Department Forestry and Fire Protection Land Ownership

California American Water Company - County of Sonoma GIS Central

City Footprints - Permit and Resource Management Department (PRMD), County of Sonoma, 2006

City of Rohnert Park Land Use - City of Rohnert Park General Plan, 2018

Climate Station Locations - MesoWest, CoCoRaHS and UC Davis, Sonoma Water

County Line - County of Sonoma GIS Central

Elevation - Sonoma County Vegetation Mapping and LiDAR Program, North American Vertical Datum 1988 (NAVD88)

General Plan Land Use - Sonoma County Permit Resource Management Department, 2020 General Plan

GSP Study Area Watershed - Sonoma Water

Groundwater Availability - Sonoma County Permit and Resource Management Department (Permit Sonoma)

Groundwater Basins - California Department of Water Resources, Bulletin 118

Land Use Survey - Department of Water Resources, 2012 land use survey

Major Rivers and Creeks - Department of Water Resource, National Hydrography dataset

Managed Wetlands - Department of Water Resources, 2014 Crop Mapping

Protected Areas - California Protected Areas Database, 2017 holdings

Resource Conservation District (RCD) - County of Sonoma GIS Central

Sonoma State - County of Sonoma GIS Central

Vegetation and Agriculture classes - Sonoma County LiDAR and Vegetation Mapping Program and Sonoma Water

Water Companies & Other Public Water Suppliers - County of Sonoma GIS Central

Water Infrastructure - Sonoma Water

Water Wells and Well Density - by Sonoma County Water Agency with source data courtesy of California Department of Water Resources Online System for Well Completion Reports (OSWCR - https://data.cnra.ca.gov/dataset/well-completion-reports), Permit Sonoma, and the USGS Well Density and Known well Locations – U.S. Geological Survey dataset developed for Hydrologic and Geochemical Characterization of the Santa Rosa Plain Watershed, Sonoma County, California (https://pubs.usgs.gov/sir/2013/5118/)

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Appendix 1-A
Comments Received on Santa Rosa Plain Groundwater Sustainability Plan

SANTA ROSA PLAIN GSP COMMENTS: EXECUTIVE SUMMARY			
Date Received	**Commentor**	**Comment**	**Responses to Comments**
COMMENTS RECEIVED OCTOBER 1-31, 2021			
10/2/2021	Aaron Prysock	Hello, I began to look over the plan, and I must say that it is quite extensive and intimidating for the layperson. Are you able to put out a more concise version for regular everyday joes like me to understand without the need for a dictionary and thesaurus? Thanks, Aaron Prysock	The Executive Summary provides a concise description of the plan and its findings. The abbreviations and acronyms and glossary include definitions of frequently used technical terms and acronyms.
10/31/2021	Bob Anderson	When looking at the 3 draft GSPs – there are many similarities as to analysis and work product. One item stands out given there is also a slight variation on the dates – sometimes the 20-year period runs to 2041 and sometimes it is 2042 or the 50-year period is 2070 or sometimes 2072. It would be good to have the 3 all have a single version "Readers Digest" – to allow for assessing what is the same, what is different between each of them.	Comment noted.
COMMENTS RECEIVED AUGUST 2021 VERSION			
8/31/2021	Bob Anderson	P. 2: Kenwood Basin, Wilson Grove Basin, I think it is also Petaluma Valley Basin (not subbasin)	Noted - text corrected
		p. 3: Is this goal accomplished? "develop a Plan that achieves and maintains groundwater sustainability 50 years into the future."	Comment noted
		p. 3: "This GSP presents detailed, technical information to build upon the work of done in the GMP and to better understand groundwater in the Subbasin."	Noted - text corrected
		p. 6: Figure ES-3: Along right side of gray area, "Sonoma W" need correction	Noted - text corrected
		p. 9: Deeper recharge takes decades or longer to reach the aquifers, due to long travel paths. ? how this works with Projects and Actions showing improvement in Deep aquifer from Group projects?	Added 'may' take decades or longer...Improvements come through reductions in pumping from the deep aquifer system associated with conservation projects and from ASR, which directly reaches deep aquifer
		P. 10: needs a closer look. First sentence is 'shallow' then 24 are deep, then 15? Deep or shallow? "Groundwater levels: Groundwater levels for the majority of shallow-aquifer wells are generally stable. More limited data from the deeper aquifer system finds 7 of 24 wells exhibit relatively stable groundwater levels, 15 of the wells in the southern portions of the Subbasin and along the western boundary exhibit increasing trends, and only 2 wells, located east of and outside the Subbasin but within the contributing watershed area, have declining levels.	Noted - text corrected and clarifications added
		Groundwater storage decline = Groundwater storage: The groundwater budget (described below) finds that the amount of groundwater stored in the shallow and deep aquifer systems is declining on average by about 2,100 acre-feet per year (AFY).	Comment noted

Date Received	Commentor	Comment	Responses to Comments
		P. 13: The 20-year modeled period from WY 2021 to 2040 is used to determine the sustainable yield of the Subbasin. The average total annual groundwater pumping for this period is 23,900 AF, which is defined here as the sustainable yield. This value is 39% of the average total annual groundwater inflows into the Subbasin and is greater than average total annual groundwater pumping over the current budget period. It should be emphasized that the sustainable yield is dependent on the simulated climate conditions and assumed future pumping during this period and is not predicated on implementation of projects and actions, **i.e., no projects or actions are included in the model simulation to estimate the sustainable yield.**	Comment noted
		P. 14: wording switched from 'results' to 'conditions': Central to SGMA is the development of sustainable management criteria (SMC) for the sustainability indicators. The Santa Rosa Plain GSA identified undesirable results, minimum thresholds, measurable objectives, and interim milestones for the sustainability indicators as discussed in Sections 4.4 through 4.10. The five sustainability indicators applicable and relevant to the Subbasin are listed below with a summary of what the GSA considers significant and undesirable conditions for each indicator. Table ES-2 provides the Sustainable Management Criteria for all sustainability indicators.	Noted - text corrected
		P. 16: definitions show terms separately for Conditions and Results: Significant and Unreasonable Condition: A qualitative statement regarding conditions that should be avoided. Undesirable Results: A quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the Basin.	Comment noted
		P. 19: extra period after '50-year projection." Check on wording of whole phrase: The projects in all three groups are simulated to reduce the average decline by 400 AFY between 2021-2040 and 300 AFY over the entire 50-year projection.is estimated to decline by an average of 1,400 AFY between 2021- 2070.	Text revised based on addtional modeling
		Additions to Executive Summary – two figures presenting the story for all scenarios 1976-2070. From page 88 of 109 in Section 3 Fig 3-46. Groundwater Inflows by Water Budget Period – Historical, Current and Future) and on P. 91 of Section 3, Fig. 3-48. Groundwater Outflows by Water Budget period.	Comment noted
9/10/2021	Wayne Haydon	Figure ES-1 Plan Area: Line weight for "Other groundwater Basins and Subbasins" in explanation does not match line weight on map.	Noted - Figure to be corrected
		Figure ES-3: Line weight for "Contributing Watershed Area" in explanation does not match line weight on map.	Noted - Figure to be corrected
		Page 12. "The projected water budget covers the years 2021 – 2070." Can we add a chart for the water budget from 2021-2070, like Figure ES-6. Could use Figure 1-30, right side.	Changed to Water Years 2021-2070
		Page 19. "Groundwater storage: Groundwater in storage under a baseline scenario without projects is estimated to decline by an average of 200 AF between 2021-2040 and 1,400 AFY over the entire 50-year projection period that includes a simulated extreme 20-year drought between 2050 and 2070. The projects in all three groups are simulated to reduce the average decline by 400 AFY between 2021-2040 and 300 AFY over the entire 50-year projection.is estimated to decline by an average of 1,400 AFY between 2021-2070." Last sentence "is estimated…" needs a beginning.	
9/7/2021	Robert Pennington	General comment - I recommend shortening this section where possible. A few suggestions of sections that could be shortened include: a. Discussion of pre-SGMA GMP; b. History related to basin boundary; c. Geology section (paragraph 2 of HCM). d. Water Budget. Perhaps methods, description of climate scenarios and other details could be reserved for the main body of the report.	Text revised and shortened

Date Received	Commentor	Comment	Responses to Comments
		Page 9 - "The deep aquifer system is generally confined to semi-confined and is not physically connected with surface water". COMMENT: It is unclear what is meant by "physically connected". Spatially or hydraulically? Though spatially disconnected, it should be made clear that there is expected to be hydraulic connection between the deep aquifer and shallow aquifer, which therefore results in hydraulic connectivity between the deep aquifer and surface water.	The deep aquifer system is generally confined to semi-confined and is not spatially connected with surface water (although hydraulic connections between the shallow and deep aquifers result in hydraulic connectivity between surface water and the deep aquifer).

SANTA ROSA PLAIN GSP COMMENTS: SECTION 1 INTRODUCTION			
Date Received	**Commentor**	**Comment**	Responses to Comments
COMMENTS RECEIVED ON AUGUST 2021 DRAFT			
10-31-2021	Coalition including: The Nature Conservancy, Audubon California, Local Govt Commission, Union of Concerned Scientists, Clean Water Action/Clean Water Fund (Coalition)	Stakeholder engagement during GSP development is insufficient. SGMA's requirement for public notice and engagement of stakeholders is not fully met by the description in the Community Engagement Plan (Appendix 1-E). The GSP states that the GSA Advisory Committee includes representatives from the tribal and environmental stakeholder community, and that the Advisory Committee will continue to meet during GSP implementation. However, we note the following deficiencies with the overall stakeholder engagement process: The GSP documents opportunities for public involvement and engagement through monthly informational emails, the GSA website, public forums, presentations to stakeholder groups within the subbasin, a rural community engagement program, and GSA Board, Advisory Committee and community meetings. There is no explicit identification of a DAC representative on the Advisory Committee or other outreach targeted to DACs and drinking water users. Other than representation on the Advisory Committee, outreach to tribes and environmental stakeholders is described in general terms. The role that the Advisory Committee plays during the GSP implementation process is unclear. **RECOMMENDATIONS:** 1. In the Community Engagement Plan, describe active and targeted outreach to engage DACs and domestic well owners throughout the GSP development and implementation phases. Refer to Attachment B for specific recommendations on how to actively engage stakeholders during all phases of the GSP process. 2. Provide more information on the role of the Advisory Committee during the GSP implementation process. 3. Utilize DWR's tribal engagement guidance to comprehensively address all tribes and tribal interests in the subbasin within the GSP.	Specific stakeholder engagement during various phases of GSP development and implementation is described in Sections 1.4.2. Language added describing DAC representation on the Advisory Committee and on specific outreach to drinking water users (rural residential well owners). Language added to Section 1.4 regarding outreach to tribes , environmental and other stakeholders, and in Section 1.4.2.4 regarding the ongoing role of the Advisory Committee. Langauge added to Section 1.4. The community engagement plan will be updated during the GSP implementation process. Language added. Comment noted. Language added regarding post-GSP tribal engagement.
10/31/2021	Russian River Keeper	p. 2: To help increase the representation of underrepresented communities, we would encourage the SRBGSA to broaden outreach to local community groups that are directly involved in water quality and environmental justice issues throughout the region. Coordinating with a broader range of community groups on education and implementation will be beneficial and necessary to the long-term success of the GSP.	Comment noted.

Date Received	Commentor	Comment	Responses to Comments
		p. 3 There also needs to be a section or appendix that defines how terms are being used within this GSP specifically. This will not only help with consistency in use of terms, but it will also help the lay person understand what is being said throughout this GSP.	Glossary will be provided in final GSP.
COMMENTS RECEIVED ON AUGUST 2021 DRAFT			
8/31/2021	Bob Anderson	P. 3, paragraph 3, correct from "Sonoma Valley" to Santa Rosa Plain p. 14, Phase 2, changes from Sonoma Valley to Santa Rosa plain p. 16, Appendix reference to Sonoma Valley; change to Santa Rosa Plain p. 17, references Sonoma Valley community engagement plan p. 22, Not sure why chair and vice-chair start at August 2017 and everyone else at Oct 2017 P. 33, update the * for final draft	Noted - text corrected Noted - text corrected Noted - text corrected Noted - text corrected Comment noted Comment noted
COMMENTS RECEIVED ON JANUARY 2021 DRAFT			
2/8/2021	Elizabeth Cargay	Easy to read and complete except no appendices list was listed in the TOC. It would have been more helpful to do a full review. This review form is easy to use. Can we save our comments to come back to later, or to have all of our comments from one agency submit at once? Figure 1-1	Comment noted
2/7/2021	Beth Lamb	Well organized	Comment noted
2/7/2021	Peter Martin	Multiple small edits; in multiple locations, a word appears to be missing after SGMA ("implementation"?)	Noted -- text corrected
2/7/2021	Rue M Furch	Three suggestions: 1) add a map showing the basin and how it fits in the watershed. 2) Mention the COVID years and adaptations made to continue outreach. 3) Community Engagement should include radio ... and possibly text or other media used more commonly by DAC. Section 1, Lines 28, 32 & 48 ... "designated medium or high priority" ... for a citizen - "medium or high" what? water table? at risk? what? Line 68: insert link to map MAPS WILL BE INSERTED INTO FINAL DOCUMENT Line 110: grammar Line 165 "was" or "will be" released? Line 247: are monthly notices being sent? (to which list?) Line 256: is this happening?	Figures added that show basin within watershed. Added language regarding COVID adjustments. Comment noted regarding engagement. Added clarifying text. Maps inserted in subsequent versions. Corrected grammar and made other edits. Montly updates are sent to email list of about 1500 stakeholders.
	Holly Roberson	In multiple locations: Change to state agency's evaluation, assessment, and approval of the GSP.	Noted -- text corrected
2/6/2021	Holly Roberson	This is a strong introduction; it clearly shows that extensive work and public outreach has gone into the development of the Santa Rosa Plain GSP.	Comment noted
2/3/2021	David Long	Well written and presented	Comment noted

Date Received	Commentor	Comment	Responses to Comments
2/2/2021	John Rosenblum	1. The comments page is very limiting and impossible to complete both "general" and "specific" comments in a single effort (therefore, I'm putting everything in a single "general" box). 2. Omits that the 2019 boundary adjustment included not only the City of Sebastopol, but also the jurisdictions of (1) Belmont Terrace Mutual Water Company, (2) Kelly Mutual Water Company, and (3) Fircrest Mutual Water Company. 3. All 3 Sebastopol-area mutual water companies are active in and represented by IWS. They are therefore members of the GSA. They are omitted in the listing of active IWS members in this document. 4. There are communication obligations for board members, advisory committee members and the public - but none for GSA/Sonoma Water staff. For Sebastopol-area members and representatives this has resulted in deflections, omissions, and lack of substance in exchanges about our recharge area in the Wilson Grove Highlands. 5. Omitted from the introduction is any mention that Sebastopol-area boundary adjustments were made (along with Petaluma and Marin) to reduce DWR's designation of Wilson Grove Highlands from "medium" to "low" - and subsequent release of Sonoma County from preparing a costly separate GSA. (A staff presentation showed how weightings relative to population in DWR's EXCEL spreadsheet were the main factor).	1. Acknowledged. Will change for future comments. 2. Added language. 3. Listed these water companies 4. Comment acknowledged 5. Language added.
2/2/2021	John Rosenblum	Too "happy"	Comment acknowledged
2/1/2021	Craig Scott	Line 41 - remove \high\" as basin is designated as a medium priority basin." Additional small edits.	Text revised
2/1/2021	Mark Grismer	Good overview, seems complete and readily understood.	Comment acknowledged
1/28/2021	Joe Gaffney	No comments. Good job!	
1/26/2021	Bob Anderson	Needs work. Line 132: Should phone number be updated to be the same as number used in GUIDE? Add title for Appendix 1-A. Make consistent capitalization for Interested Parties List. Include links on lines 286-296 (if using links elsewhere). Appendix 1-D has an "Appendix A and B and Attachment A (parts of 1-D but adds element of confusion). Page numbering should be consistent (between Section text and appendices)	Comments acknowledged. Title added. Punctuation and grammar revised. Page numbering revised.
1/25/2021	Bob Likins	Maps are good as long as they can be made clear.	Comment acknowleged.
1/25/2021	Bob Likins	I am hopeful that each section can also be prefaced by a shortened section with key points summarized ,,,,, like a one or two page version of this eight page introduction. The length of the final report will discourage some interested readers from attempting to read and understand what you will want to tell them if there is no shorter version. ..... Bob	Executive summary provided in subsequent versions.
1/24/2021	Wayne Haydon	73 District (RCD); and an organized group of Mutual Water and Public Utilities Commission- 74 Regulated Companies (Independent Water Systems) WDH comments Where listed? Where Board members and AC members listed? 110 reports to the GSA Board identifying areas 172 Phase 4: Implementation and Reporting -- Following the submission of the GSP to DWR, the 173 Santa Rosa Plain GSA will begin implementation of projects and programs? 211-215 DAC are also a state designation.	Revisions and corrections made to address comments; added appendix listing Board and Advisory Committee members.

Date Received	Commentor	Comment	Responses to Comments
Comments from 2018 Introduction & Plan Area Section (prior to separating the Introduction & Plan Area into separate sections)			
Date Received	**Commentor**	**Comments**	Responses to comments
11/26/2018	Jennifer Burke & Colin Close	Gold Ridge Resource Conservation District The Santa Rosa Plain GSA formed an Advisory Committee of 18 members in October 2017 consisting of appointment of members appointed by from each of the nine-member agencies, the City of Sebastopol and the Federated Indians of Graton Rancheria, and nine seven interest based members appointed by the Santa Rosa Plain GSA Board: 2 - Environmental (from organizations with a presence in the Basin) • 2- Rural residential well owner • 1 - Business community • 2 - Agricultural • 1 - Federated Indians of Graton Rancheria • 1 – City of Sebastopol	Text revised
		both abut a small eastern segments segment of the Santa Rosa Plain Subbasin boundary.	Text revised Text revised
		Area Subbasin, Alexander Area Subbasin, and Wilson Grove Formation Highlands Basin.	Text revised
		In 2014, the State of California enacted the Sustainable Groundwater Management Act, which includes requirements that must be addressed in the Santa Rosa Plain, as this area is considered a medium priority groundwater basin.	Text revised
		Rosa, Sebastopol, Town of Windsor, several unincorporated communities, and areas of rural Recycled water is treated to tertiary standards and provided by the Town of Windsor's, and the City of Santa Rosa's Laguna Treatment Plant, and the Airport Larkfield's Wwastewater Ttreatment Pplants and is used for crop and landscape irrigation in lieu of using groundwater or imported water.	Text revised
		Recycled water is ~~relied upon for agricultural purposes~~ used to irrigate vineyards, dairies, and pasturelands, as well as landscaped parks, commercial properties, schools and golf courses. *Suggest we add information regarding how much acreage is irrigated by recycled water/how much water is used for irrigation purposes in all these service areas.*	Text revised
		Suggest deleting the following sentence – it's not entirely correct as recycled water from both Santa Rosa and Windsor goes to the Geyers and not sure it's relevant as we should be indicating how much acreage is irrigated/how much water is used to offset gw/imported water in the basin ~~: A significant portion of the total recycled water produced from Laguna Treatment Plant is delivered for energy generation to the Geysers Geothermal Steamfield located in the Mayacamas Mountains outside of the Subbasin and contributing water shed areas.~~	Text revised
		Suggest spelling out acronym afy – it's the first time used in this document.	Text revised
		Suggest spelling out acronym CASGEM - it's the first time used in this document.	Text revised
		The City of Santa Rosa ~~adopted~~ submitted the final SNMP in 2013 and the NCRWQCB approved the SNMP in a letter dated September 1, 2015.	Text revised

Date Received	Commentor	Comment	Responses to Comments
		Suggest including info about CIMIS (California Irrigation Management Information System) to this section. There are multiple stations in the basin. See listing of stations here (sort by County for easy identification of local stations) : https://cimis.water.ca.gov/Stations.aspx)	Text revised
		Rosa ~~Plan~~ **Plain**	Text revised
		Formatting problem – sentence appears to not be justified correctly	Formatting corrected
		The Water Supply Strategies Action Plan **(Action Plan)** was… *There are many "plans" referred to in this chapter. Where possible, use different acronyms*	Text revised
		Immediate actions identified within the **Action P**lan that are specific to groundwater include:	Text revised
		Add a sentence regarding the City of Santa Rosa's climate plan efforts – although we are part of the RCPA, we have separate Climate Action Plans that the regional plan refers to. Suggest inserting the following sentence: In addition, the City of Santa Rosa has prepared two Climate Action Plans – the Community-wide Climate Actin Plan and the Municipal Climate Action Plan which complement the Regional Climate Action Plan (https://srcity.org/1634/Climate-Action-Planning)	Text revised
		CUWCC is now called California Water Efficiency Partnership (CalWEP)	Text revised
		Each of these member utilities, in addition to the City of Sebastopol and California American Water Company, have water conservation programs to assist their communities in **improving water use efficiency** and reducing water waste ~~use~~.	Text revised
		Specific urban residential programs for **increasing** indoor (high efficiency toilets, fixtures, and washers) and outdoor (landscaping assistance, surveys and retrofits) ~~for increasing~~ conservation.	Text revised
		The MWELO was most recently updated in 2015 and all entities were required to comply. This section needs to be updated accordingly.	Text revised
		landowners ~~is~~ **called** ~~the~~ "Slow it. Spread it. Sink it. Store it!" ~~publication~~ produced by the Sonoma RCD.	Text revised
		A guide focusing on rainwater catchment systems ~~is~~ **called** ~~the~~ "Roof Water Harvesting for a Low Impact Water Supply" ~~booklet~~ produced by the…	Text revised
		The ~~resulting plan~~ **Russian River Regional SWRP** provides a framework for submitting, quantifying, scoring, and ranking future projects in an objective and data driven format.	Text revised
		The description for this section needs to be updated - In early 2013, jurisdictions that had been designated as Phase II municipalities within the Russian River Watershed were provided an option to align with the Phase I program in an effort for watershed-wide consistency and collaboration. The cities of Cloverdale, Cotati, Rohnert Park, Healdsburg, Sebastopol, Ukiah, and the Town of Windsor, and the Phase II designated portions of the County of Sonoma elected to participate in the Phase I program as Co-Permittees. *Also suggest including link to the LID manual*	Text revised
		~~The Water Agency~~ **Sonoma Water**	Text revised
		local agency responsible for administering permits for wells within the Subbasin. *(Missing a period at end of sentence)*	Text revised
		Figure 2-9 – add classification numbers to the key, so Class 1-4 areas are numbered according to the discussion in lines 931-933 and 937.	Figure revised

Date Received	Commentor	Comment	Responses to Comments
11/29/2018	Wayne Haydon	North Coast Resource Partnership Integrated regional water Management Plan The North Coast Integrated Regional Water Management Plan (NCIRWMP) was formed in 2004 as a voluntary, non-regulatory, stakeholder-driven planning framework meant to emphasize shared priorities and local autonomy, authority, knowledge, and approaches to achieving Tribal, state, regional, and local priorities related to North Coast water infrastructure, watersheds, public health, and economic vitality. The NCIRWMP changed it's name in early 2013 to the North Coast Resources Partnership (NCRP) to distinguish the partnering entities and cooperative process comprising the NCRP, and to recognize and emphasize that the NCRP is embarking upon a more well-rounded planning effort in order to meet all of the social, economic, and environmental challenges facing the North Coast, not only those directly related to water. The NCRP continues to focuses on areas of common interest and concern to North Coast stakeholders and on attracting funding to the North Coast Region, and recognizes unique local solutions in different parts of the Region(https://northcoastresourcepartnership.org/). is a stakeholder driven colaboration among local goverment, watershed groups, tribes and interested partners in the North Coast region of California (http://www.northcoastirwmp.net) The North Coast comprises seven counties, multiple major watersheds, and a planning area of 19,390 square miles, representing 12% of California's landscape, including the Plan Area. It is a "source region" – for clean water, carbon sequestration, and biological diversity and provides these benefits to other parts of California and the world. The NCRP's focus areas include restoring salmonid populations, enhancing the beneficial water uses, promoting energy independence, reducing greenhouse gas emissions, addressing climate change, supporting local autonomy and intra-regional cooperation, and enhancing public health and economic vitality in the region's economically disadvantaged communities. The NCRPIRWMP serves as a comprehensive planning tool that links other water resources management plans and programs through collaborative processes, coordination and communication.	Text revised Section revised Section revised; it was very long compared to other sections, and was edited to be consistent in length and format. Text revised
1/14/2019	Advisory Committee	Change logo	Revised
		The two are confusing because irrigated ag could be assumed to be GW. The next map is recycled water and shows all purple. Should include recycled water on 2.4b.	Figure revised
		Highway 12 needs to be a line. Currently it looks like the basin boundary.	Figure revised
		How we represent knowledge of wells and quantity? Do we need to represent this as documented water wells (not estimated or inferred)? Need to clarify that data set is what is documented and not necessarily what is there.	Figure revised
		Locating wells from databases is very difficult. Is this map of wells from the state's database?	Figure revised
		Should note if it's a hybrid of different things	Figure revised
		Should include a disclaimer that the figure is simplified, since it has to be so general.	Figure revised

SANTA ROSA PLAIN GSP COMMENTS: SECTION 2 PLAN AREA			
Date Received	**Commentor**	**Comment**	**Responses to Comments**
COMMENTS RECEIVED FROM OCTOBER 1-31			
10/11/2021	Jim Mangels	Fig. 2-6. I was disappointed with this figure. Why have a figure if the data is incomplete "information is based on limited and incomplete information". Not knowing the location and density of water wells in inappropriate. Should that information be available from user permits? Does this mean that permits and water meters are not employed universally? How can water usage from water wells be known without this information. We need to know how much ground water is being used and from what wells, and these customers need to pay their fair share.	Comment noted. Information is based on best available records from well logs, many of which are incomplete or not digitized. The Santa Rosa Plain Groundwater User Information Data Exchange program was developed to improve the database.
10-31-2021	Coalition	RECOMMENDATIONS: Provide a map of DACs and more information about the population of each identified DAC. 1. Identify the sources of drinking water for DAC members, including an estimate of how many people rely on groundwater (e.g., domestic wells, state small water systems, and public water systems). 2. Include a domestic well density map for the subbasin. 3) Include a map showing domestic well locations and average well depth across the subbasin.	Figure 2-3 modified to show DACs and tribal lands in trust and text was added to Section 2 to describe main sources of drinking water for DACs. Regarding the well density map, there is not a requirement that well density for each use type is prepared. The well density map required by the GSP regulations in included as Figure 2-6a shows density of all known water suppl wells in the Subbasin. Figure 2-6b added to display the approximate known depths of water wells and language added regarding estimated number of domestic wells. Current information regarding specific well types are inadequate to reliably display the densities of all different well types, including domestic wells. In general, the
COMMENTS RECEIVED ON AUGUST 2021 VERSION			
8/31/2021	Bob Anderson	P. 4: appears to be from another GSA's GSP: The San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) implements water quality regulations in the watershed, including establishing Total Maximum Daily Loads for pathogens and sediment in Sonoma Creek, adopting General Waste Discharge Requirements (WDRs) for vineyard discharges, and for stormwater and wastewater discharges. The WDRs for vineyard discharges require development of a farm plan, which outlines best management practices (BMPs) implemented to reduce sediment and stormwater runoff and monitoring and reporting. P. 6: this may be generally the case but Sonoma County's GP has a Water Resources Element. General plans include seven mandatory elements, and the conservation element of the general plan is typically where water resources are addressed, although other water-related topics may also be addressed in other elements	Noted - text corrected Noted - text corrected

Date Received	Commentor	Comment	Responses to Comments
		See: 2.2.2 Sonoma County General Plan 2020 In recognition of the importance of water resources within unincorporated areas of the county, an optional new water resource element (WRE) was developed and included in the Sonoma County General Plan 2020 (Sonoma County 2008). P. 5: through Section 2.3? 2.2 General Plan and Related Plan Land Use Categories Existing city and county planning activities that are directly or indirectly linked with water supply and groundwater management include general plans, specific plans, and Urban Water Management Plans (UWMPs), which are described in Section 2.2.1 through 2.4.1. P. 9: An overview of the spatial distribution of the reliance on the four primary water source types by primary water use sectors in the Subbasin is shown on Figure 2-5 and provided in Sections 2.4.1 through 2.4.4 (2.4.1 Groundwater – begins on page 10 of 42) P. 10: not Regional: 2.4.4 Recycled water produced from the City of Santa Rosa Regional Water Treatment System (serving Santa Rosa, Cotati, Rohnert Park, and Sebastopol). From https://srcity.org/ArchiveCenter/ViewFile/Item/4272 Santa Rosa Water operates the Laguna Subregional Water Reclamation System which serves the residents in Santa Rosa, Rohnert Park, Cotati, Sebastopol, and unincorporated areas of Sonoma County. The hub of the Subregional Water Reclamation System is the Laguna Treatment Plant, P. 13: may need to clarify use of "for years" – this wording makes it sound like a big data gap. The station is located at the Charles M. Schulz Sonoma County Airport. Data are available from 1903 to the present at this station; however, the station dataset does not contain a complete record of daily rainfall for years P. 14: SRP. There is one station in the Sonoma Valley Basin and two in the contributing watershed: (1) P197, located on Highway 12 at Fulton Road; P. 25: be good to add a link to the two USGS reports: (1) Nishikawa, T., ed. 2013. Hydrologic and geochemical characterization of the Santa Rosa Plain watershed, Sonoma County, California. U.S. Geological Survey Scientific Investigations Report 2013-5118, 178 p. and (2) Woolfenden, L.R. and Nishikawa, T., eds. 2014. Simulation of groundwater and surface-water resources of the Santa Rosa Plain watershed, Sonoma County, California. U.S. Geological Survey Scientific Investigations Report 2014-5052, 258 p.	Noted - text corrected Noted - text corrected Noted - text corrected Noted - text corrected Noted - text corrected Noted - text corrected Links have been removed from main body text, but are included with references (Appendix 8) if part of citation.
9/2/2021	Elizabeth Cargay	Fig. 2-7b: The Windsor well shown in the very northeast part of Town is not a Windsor inactive well. It is a volunteer well. It does not belong to the Town, it belongs to an HOA. Please change.	Figure revised
9/7/2021	Robert Pennington	3. Page 8 - "Groundwater is also an important supplemental **or backup source** of supply for many of the municipal water purveyors, including Sonoma Water; the Cities of Santa Rosa, Rohnert Park, and Cotati; and California American Water Company's Larkfield District, all of which operate municipal wellfields within the Subbasin and contributing watershed areas" COMMENT: I believe groundwater is the primary source for Cal-Am, and Russian River water is secondary/backup.	Noted - text corrected

Date Received	Commentor	Comment	Responses to Comments
		4. Page 17 - The Sonoma-Marin Saving Water Partnership represents 10 water utilities in Sonoma and Marin counties that are signatories to the California Water Efficiency Partnership and have joined to create a regional approach to water-use efficiency. Within the Subbasin, these utilities include the Cities of Cotati, Rohnert Park, and Santa Rosa; the Town of Windsor; and Sonoma Water. COMMENT: I believe Sebastopol is now a member	Sebastopol is not a current member, but Cal-American Water - Larkfield is. Added Cal-am.
COMMENTS MADE ON FEBRUARY 2021 RELEASE OF SECTION 2			
3/8/2021	Beth Lamb	This whole document need a tech editor to go over formatting. So many inconsistencies makes the document look sloppy. I assume that much of this section was cut and paste from other documents and therefore uses lots of different styles were used. Table of contents needs to be revised formatting issues.	Comment acknowledged. Tech editor engaged.
		Minor items: 1) Need an abbreviations list/table.	Text revised
		2) Are you doing penultimate common or not choose one and stick to it.	Comment acknowledged
		3) For lists some times there are bullets, other times numbers and then some times nothing. Be consistent.	Comment acknowledged
		4) Note to reader format different one time it is a new paragraph that is in italics (see page 7) then is is at the end of a sentence in parentheses (see page 8) Be consistent!	Comment acknowledged
		5) "In Lieu" should be italicized as a foreign word or use another word. (page 8 paragraph 5) suggest using "instead of"	Comment acknowledged
		Specific comments: Page 3 Paragraph 2 - The Subbasin includes the Town of Windsor; cities of Cotati, Rohnert Park, Santa Rosa, and Sebastopol; and areas of unincorporated rural communities and agricultural cultivation. Very confusing punctuation then and agricultural cultivation doesn't fit. It is apples and oranges. If you include cultivation then shouldn't you includes dairies and breweries and vineyards and parks and forest and open space,	Text revised
		Page 3 paragraph2 "Neighboring groundwater basins and subbasins are also shown on Figure 2-1 and include the very low-priority Healdsburg Area Subbasin (designated as basin 1-55.02 by DWR) to the north, the very low-priority Wilson Grove Formation Highlands Basin (designated as basin 1-059 by DWR) to the west, and the medium-priority Petaluma Valley Subbasin (designated as basin 2- 001 by DWR) to the south. The very low-priority Alexander Area Subbasin (designated as basin 1-054.01 by DWR) and the very low-priority Rincon Valley Subbasin (designated as basin 1- 054.03 by DWR) both abut a small eastern segment of the Subbasin boundary. The only neighboring GSA is the Petaluma Valley GSA, which formed in June 2017 and is responsible for implementing SGMA in the Petaluma Valley Basin.	

Date Received	Commentor	Comment	Responses to Comments
		What about 1) the Sonoma GSA , 2)The lower RR valley basin, 3) the Kenwood valley basin. If you don't mention these basin then you need a topic sentence her like these are the basins the are adjacent to is neighboring=adjacent? If they are on the map they should be discussed in this paragraph. Page 4 Paragraph 3 - Existing city and county planning activities that are directly or indirectly linked with water supply and groundwater management include general plans,specific plans, and Urban Water Management Plans (UWMPs), which are described below. needs a space between plan, specific	Text revised Text revised
3/7/2021	Bob Anderson	Very thorough. A couple of minor points: page 8 of 24: re Recycled Water: Rohnert Park also uses recycled water on its parks and golf course. "city of Santa Rosa's Laguna Treatment Plant" is the "Subregional" serving SR, RP, Cotati and Sebastopol page 13 of 24 - be good to also include a link for the two USGS studies page 15 of 24 Is there a date for Sebastopol's? Water Master Plans have been developed by the cities of Cotati (Cotati, 2011), Santa Rosa (Santa Rosa, 2014), Sebastopol and Town of Windsor (Town of Windsor, 2011) page 20 of 24 - new term (Laguna-Mark West) / different than 'subbasin'? The Stormwater Management Groundwater Recharge study assessed the feasibility of projects in Laguna-Mark West watershed (subwatershed of the Santa Rosa Plain watershed), which informed the development of the Russian River Regional SWRP. On Figures several legends have extra white lines or overlays. Figure 2-5 has Hwy 1 on lower left and aqueduct not on legend.	Comment ackwnowledged Landscape' irrigation encompasses parks and golf courses Text revised Links included in references, not in main body text. Added Text added to clarify Figures revised
3/5/2021	Peter Martin	Overall comment - SGMA Reg. § 354.14 requires a description of the Hydrogeologic Conceptual Model (HCM), it is unclear if that is part of the descriptions included in this chapter? If so, it needs to be called out. If that is to be included elsewhere that needs to be called out. It makes sense that it would be at the beginning of Chapter 2. Section 2.1, Page 4 - Inflow from outside the boundary is references. Is there a reason why there is no reference to the outflow? Section 2.2, Page 4-5 - Should reference Government Code 65350.5 that stipulates before General Plans are adopted they must review and consider GSPs. That is an important linkage... Section 2.2, Page 6 - City of Santa Rosa General Plan: General Plan 2050 is in development, slated for final review in Fall 2022. Contact is Andy Gustavson - AGustavson@srcity.org	HCM described in Section 3 Described in more detail in Section 3 Text revised Text revised

Date Received	Commentor	Comment	Responses to Comments
		Urban Water Planning, Page 14 - DWR UWMP guidelines only require planning on 20 year horizon. Check that all participants are planning UWMPs with 25 year projections. Urban Water Planning, Page 14 - UWMPs also include reporting on water conservation activities, targets and compliance	Text corrected Text revised
3/3/2021	Marlene Soiland	No comments	Comment acknowledged
3/3/2021	Mark Grismer	The section appears to be complete and was easy to read and sort through. Appreciated the links to outside resources within the text and the inclusion of the many agency or County programs affecting water planning or conservation within the Basin.	Comment acknowledged
3/3/2021	Wayne Haydon	Page 13. North Coast Resource Partnership Replace first paragraph with the following In 2002, the California Legislature approved the Integrated Regional Water Management Planning Act (SB 1672). The implementation of the Act facilitates regional cooperation in water-resources planning, and along with the passage of Propositions 50, 84, 1E and 1, has providing grant funding for projects identified in a regional plan, referred to as an Integrated Regional Water Management Plan (IRWMP). Page 11. Climate Monitoring Data are available from 1903 to the present at this station; however, the station dataset does not contain a complete record of daily rainfall for years. Are we listing years without data here. Page 16. Groundwater Banking Feasibility Study The report states, "Based on the findings…" 1. Can we summarize the conclusions of the study? 2. Did the study find GW banking and ASR to be feasible and where and how much?	Text revised Text revised No Text revised Study referenced if readers want additional information.
2/16/2021	John Rosenblum	1. The general problem with this GSP chapter is that it needs clarify that GSA boundaries for modelling and analysis were set to surface watershed topography, rather than groundwater hydrogeology. I recommend adding the following to Section 2.1: a. Even if the political fragility of SGMA at the State level and political constraints on budget at the local level is understandable, the scientific limitations of Bulletin 118 boundaries – and GSA modelling – should be discussed. b. Even though this chapter is a technical description, setting the boundary should have been a policy/political GSA board decision (e.g. an early 2019 GSA board decision reserved funds for a scientific justification of boundary adjustments into the Wilson Grove Highlands (WGH) – rather than jurisdictional – if required by DWR). c. Applying hydrogeological boundaries is critical for GSA members in the Sebastopol area; adequate analysis of GSA members' recharge is required by SGMA.	Addressed in Section 3 Addressed in Section 1 Comment acknowledged

Date Received	Commentor	Comment	Responses to Comments
		d. Fig 2-3: need to explain that the jurisdictional boundary of Gold Ridge RCD extends far West of the Contributing Watershed Area. Also that the RCD's "Green Valley" section covers Wilson Grove Highlands recharge area for Sebastopol members' wells.	Comment acknowledged
		2. Section 2.3 General Land Use Characteristics, Fig 2-4a, Fig 2-4b, Fig 2-4c,and Fig 2-5 need to explain that Ag and residential land use does not stop West of Bulletin 118 - and GSA's modelling – boundaries (while a much larger area East of the Bulletin 118 boundary is included in modelling).	Comment acknowledged; figures only show watershed boundaries.
		3. Section 2.4, Water Source Types and Water Use Sectors This chapter should reference the March 2016 report released by O'Connor Environmental, Inc. (https://eb314f72-46be-4adb-874f-ce4ecf88f20d.filesusr.com/ugd/128aec_6782b34297cf4c9494d25d958bcd2814.pdf) about conditions and trends in the Wilson Grove Highlands (WGH). A summary of the report's relevance should be included in the GSP:	Included reference to report in Section 3
		a. Local and State data about land use, groundwater, and Ag & domestic wells in the WGH have long been available.	Comment acknowledged
		b. A specific area of continuous and thick Wilson Grove Formation in the WGH groundwater recharge area for Sebastopol-area wells was identified (smaller than DWR's proposed GSA for WGH partially shown in Fig 2.1).	Comment acknowledged
		c. Groundwater levels decreased from 2009 to 2014 in the WGH recharge area for Sebastopol GSA members' wells.	Comment acknowledged
		d. Potential groundwater extraction impacts on streamflows and dependent ecosystems/fisheries were identified.	See Section 4
		4. Section 2.4 Groundwater, Fig 2-6: need to explain that wells and groundwater flow do not stop West of the Bulletin 118 - and GSA's modelling – boundaries.	Comment acknowledged; figures only show watershed boundaries.
		5. Section 2.4 Local Surface Water: need to explain that, as noted in the March 2016 report by O'Connor Environmental, Inc, "… it is believed that the vast majority of diversions associated with Riparian Water Rights (formalized by a Statement of Use) are not reported…" (to the California State Water Resources Control Board's eWRIMS program). The report states that other data and field observations can make up for the uncertainty, which means that GSP monitoring programs must be designed to reduce the uncertainty – particularly for Sebastopol members' wells' WGH recharge.	Included reference to report in Section 3
		6. Section 2.5, Groundwater Level Monitoring: a. Sebastopol GSA members' WGH recharge area must be included in monitoring. The March 2016 report by O'Connor Environmental, Inc relied on long available groundwater level data from many domestic wells from CASGEM, and Ag wells from the Sonoma Ag Commissioner's office.	Monitoring network described in Section 5
		b. Fig 2-7a and Fig 2-7b: labelling could mislead the reader to assume that GSA members' recharge from WGH is adequately included in modelling and analysis.	Comment acknowledged

Date Received	Commentor	Comment	Responses to Comments
		7. Section 2.5 Santa Rosa Plain Salt and Nutrient Management Plan: The December 31, 2020 salination risk analysis has been published for public response (Staff Report for North Coast Hydrologic Region Salt and Nutrient Management Planning Groundwater Basin Evaluation and Prioritization). The draft proposes: a. Critical risk for the Santa Rosa Plain b. High risk for Rincon Valley and Healdsburg c. Medium risk for Wilson Grove Highlands. 8. Section 2.6, Groundwater Banking Feasibility Study: The 2013 feasibility study needs to be updated for the SGMA-required 50-year climate analysis, including: a. Increased frequency and duration of consecutive dry years b. Reduced volume of bankable winter streamflows c. Increased frequency and intensity of winter storms, with high sediment loads d. Legal/regulatory limitations due to upstream demands and surface water treatment	Text updated to include information about August 2021 report and review Comment acknowledged.

SANTA ROSA PLAIN GSP COMMENTS: SECTION 3 BASIN SETTING			
Date Received	**Commentor**	**Comment**	**Responses to Comments**
COMMENTS RECEIVED OCTOBER 1-31			
11/2/2021	Rick Savel	Below is an excerpt from a report (see SAVEL PV SRP_11022021 comment) I compiled and submitted to PRMD regarding Penngrove area Community Separator recommendations. #3) involves the shifting of the southern basin boundary divide separating the Laguna Santa Rosa and Petaluma groundwater basins in the vicinity of the surface watershed divide boundaries and hydraulic inter-connection “flow reversal” of sub-surface groundwater recharge. (CWD Cardwell,1951). My question is: **#1) will this unresolved "sub-surface" divide condition be taken into consideration when determining the basin boundaries for further analysis and evaluation of existing and future conditions and #2) as the EIR data and analysis pointed out, this involves drafting recharge from Lichau Creek which is identified as Steelhead bearing creek.** According to the State Fish & Game Lichau Creek Survey Report (See Savel_Attchmnt1_PetalumaR_LichauCr_Willowbrook), conducted summer 2007, completed March 2008, Lichau Creek should be managed as an anadromous, natural production stream. **What impact is this hydraulic inter- connection “flow reversal” of sub-surface groundwater recharge having on Lichau Creek recharge flows on Penngrove wells and fish habitat?**	Obtaining improved information on the subsurface nature and hydraulic communication accross Subbasin boundaries (including potential changes in the direction and magnitude of groundwater gradients) is identified as a primary data gap in Section 3.1.8. Planned studies and information gathering to address this data gap are described in Section 7.2.4 and include evaluation of geophysical data collected across boundaries, performance and analysis of aquifer tests, and evaluation of future groundwater-level monitoring data. It is noted, that subsequent to the conditions described by the commentor, groundwater levels within the southern portions of the Santa Rosa Plain Subbasin have recovered, reducing the potential for any future 'flow reversals' across the boundary.
10/31/2021	Bob Anderson	Page 143 of 152- to repeat a point made in earlier comments: “not able to follow this logic”: For the WY 2021 to 2040 period, rural domestic pumpage is similar to the current period. Rural domestic pumpage is projected to increase, however.	The GSP narrative has been modified for clarity
10/31/2021	Coalition	The identification of Interconnected surface water is insufficient. The GSP uses a multiple-lines-of-evidence approach to assign point values to stream segments based on the following four criteria: (a) depth-to-groundwater along stream channels, spring 2015 (b) percent of time stream is gaining, from 2000 to 2010 (c) median stream flow, from 2000 to 2010 (d) surface leakage, 2006. There are several problems with this approach. The points assigned for each criteria are arbitrary, as is the total point value that determines whether a reach is interconnected or not. Other issues include the following: · The GSP gives more points to areas of streams where groundwater elevation is higher than the stream bottom elevation. This procedure is completed for one point in time only, spring 2015. Using seasonal groundwater elevation data over multiple water year types is an essential component of identifying ISWs. The use of one date does not reflect the temporal (seasonal and interannual) variability inherent in California’s climate.	The relative values of the points are not arbitrary but rather reflect the level of confidence and significance of the various lines of evidence. Comment noted. To help address the uncertainty associated with this analysis, points were also assigned to stream reaches where the groundwater level is inferred to be below, but within 10 feet of the streambed bottom. Additionally, other lines of evidence used to map interconnected surface water does incorporate seasonal groundwater elevation data over multiple water year types.

Date Received	Commentor	Comment	Responses to Comments
		· The GSP gives more points to segments of stream that are gaining throughout the year. Losing streams are not considered in this assessment. This is problematic because stream segments that are interconnected (losing or gaining) for any percentage of time should be considered an ISW.	Losing interconnected reaches are more difficult to constrain using the model. For this reason multiple lines of evidence were used map interconnected surface water, including interpolated groundwate levels beneath stream segments and evaluation of high frequency groundwater level data near streams. This will be further assessed during GSP implementation.
		· The GSP gives more points to streams with flow more than 50% of the time. However, even short durations of flow can indicate interconnected conditions. Note the regulations [23 CCR §351(o)] define ISW as "surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water is not completely depleted". "At any point" has both a spatial and temporal component. Even short durations of interconnections of groundwater and surface water can be crucial for surface water flow and supporting environmental users of groundwater and surface water.	Comment noted.
		RECOMMENDATIONS: 1. Consider stream reaches with connection for any percentage of time as interconnected. On the map of streams in the subbasin, clearly labeled reaches as interconnected (gaining/losing) or disconnected. Consider any segments with data gaps as potential ISWs and clearly mark them as such on maps provided in the GSP.	One motivation to use the 'multiple-lines-of-evidence' approach was to account for the uncertainty in the available data. This approach allowed us to make stronger inferences from the data. With multiple sources of evidence capable of indicating interconnected surface-water/groundwater, locations and times in which only one line of evidence indicates interconnection and reasonably be removed. This approach reasonably accounts for scientific uncertainty in the data.
		2. Provide depth-to-groundwater contour maps using the best practices presented in Attachment D, to aid in the determination of ISWs. Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a digital elevation model (DEM) to estimate depth to groundwater contours across the landscape. This will provide accurate contours of depth-to-groundwater along streams and other land surface depressions where GDEs are commonly found.	This procedure was used in mapping depth interconnected surface water. The depth to water maps shared with the practitioners work group have been added to Appendix 4-C.
		3. Use seasonal data over multiple water year types to capture the variability in environmental conditions inherent in California's climate, when mapping ISWs. We recommend the 10-year pre-SGMA baseline period of 2005 to 2015.	The multiple lines of evidence approach integrates information from different datasets spanning different time periods, including 2000-2010, 2015 and 2019.
		4. Reconcile ISW data gaps with specific measures (shallow monitoring wells, stream gauges, and nested/clustere wells) along surface water features in the Monitoring Network section of the GSP.	Data gap areas for Interconnected Surface Water monitoring are depicted on Figure 5-7. Shallow or multi-level monitoring wells and/or stilling wells are proposed in 4 out of the 4 identified data gap areas. Additional stream-adjacent shallow monitoring well sites will be identified as-needed during GSP implementation.

Date Received	Commentor	Comment	Responses to Comments
		The identification of Groundwater Dependent ecosystems is incomplete. The GSP maps GDEs using the Sonoma County Veg Map, which we agree is the best available data for the subbasin. To identify where the potential GDEs are likely to have connection with groundwater, the rooting depths of common tree species were compared to available depth-to-groundwater data. The GSP states (p. 3-88): "The DTW mapping used available contoured springtime datasets for the shallow aquifer system (from 2015 and 2016) and high-resolution LiDAR data. To address GDE Work Group member concerns that groundwater levels were generally at lower levels in 2015 and 2016 due to dry conditions, minor adjustments in some areas were made to incorporate the shallowest depth-to-water on record for each well based on review of all available data from 2005 to 2020." However, no further details on the available data from 2005 to 2020 was provided.	Hydrographs of monitoring wells are provided in Appendix 3-B.
		The GSP states (p. 3-88): "Following guidance from TNC, potential vegetation GDEs were mapped for areas with DTW of 30 feet or less to incorporate the potential rooting depths of oak trees (TNC 2018)." If Valley Oaks exist in the subbasin, we recommend instead that an 80-foot depth-to-groundwater threshold be used when inferring whether Valley Oak polygons in the Veg Map derived potential GDE map are likely reliant on groundwater. This recommendation is based on a recent correction in TNC's rooting depth database,2 after finding a typo in the max rooting depth units for Valley Oak. This resulted in a specific change in the max rooting depth of Valley Oak from 24 feet to 24 meters (80 feet). For all other phreatophytes, we continue to recommend that a 30-foot depth-to-groundwater threshold be used when inferring whether all other vegetation polygons are likely reliant on groundwater.	The citation provided in comment refers to Valley Oaks inhabiting "fractured and jointed metamorphic rock". Vegetation inhabiting such geologic conditions are not relevant to the GSP as these conditions are not found within the boundary of the Subbasin. (Lewis DC Burgy RH (1964) The relationship between oak tree roots and groundwater in fractured rock as determined by tritium tracing. J. Geophys. Res. 69(12):2579-2588.)
		RECOMMENDATIONS: 1. Discuss available shallow groundwater data. Use depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around Veg Map derived potential GDE polygons. We recommend that a baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types. Refer to Attachment D of this letter for best practices for using local groundwater data to verify whether polygons in the Veg Map derived potential GDE map are supported by groundwater in an aquifer.	Comment noted. This analysis will continue with additional surface water and groundwater data collection in the future during GSP implementation.
		2. Refer to Attachment B for more information on TNC's plant rooting depth database. Deeper thresholds are necessary for plants that have reported maximum root depths that exceed the averaged 30-ft threshold, such as Valley Oak (Quercus lobata). We recommend that the reported max rooting depth for these deeper-rooted plants be used if these species are present in the subbasin. For example, a depth-to-groundwater threshold of 80 feet should be used instead of the 30-ft threshold, when verifying whether Valley Oak polygons are connected to groundwater.	The citation provided in comment refers to Valley Oaks inhabiting "fractured and jointed metamorphic rock". Vegetation inhabiting such geologic conditions are not relevant to the GSP as these conditions are not found within the boundary of the Subbasin. (Lewis DC Burgy RH (1964) The relationship between oak tree roots and groundwater in fractured rock as determined by tritium tracing. J. Geophys. Res. 69(12):2579-2588.)

Date Received	Commentor	Comment	Responses to Comments
		3. Further discuss data gaps for GDEs, including specific plans and locations for additional shallow monitoring wells.	See section 7 for information on how GSP will address data gaps in the GDE's.
		Native vegetation and Managed Wetlands: Native vegetation and managed wetlands are required to be included in the water budget. The integration of native vegetation into the water budget is insufficient. The water budget includes a separate item for evapotranspiration, but combines crop, native vegetation, and riparian Evapotranspiration into one term. The omission of explicit water demands for native vegetation is problematic because key environmental uses of groundwater are not being accounted for as water supply decisions are made using this budget, nor will they likely be considered in project and management actions. Managed wetlands are not mentioned in the GSP, so it is not known whether or not they are present in the subbasin.	See below responses to recommendations.
		RECOMMENDATIONS: 1. Quantify and present all water use sector demands in the historical, current, and projected water budgets with individual line items for each water use sector, including native vegetation.	This will be incorporated in future updates to the GSP.
		2. State whether or not there are managed wetlands in the subbasin. If there are, ensure that their groundwater demands are included as separate line items in the historical, current, and projected water budgets.	It is assumed that managed wetlands shown on Figure 2-3 within the Subbasin do not rely on groundwater. However, this is an area of uncertainty that will be evaluated during GSP implementation.
		RECOMMENDATIONS (Water model and climate change): 1. Consider other GCM projections to account for uncertainty beyond median statistics.	The median statistics were generally used to compare various GCM's and their appropriateness for the Sonoma County GSP's. The downscaled, transient GCM output for the Santa Rosa Plain Subbasin was used for the projected simulation model, not the median statistic. The chosen model includes an extremely dry and hot period near the last 20-years of the simulation period.
		2. Integrate climate change, including extreme climate scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.	The chosen model includes an extremely dry and hot period near the last 20-years of the simulation period.
		3. Incorporate climate change into surface water flow inputs, including imported water, for the projected water budget.	This was performed for the GSP. See appendix 3-D, section 3.5, which shows that the Russian River is capable of meeting demands for all climate scenarios.
		4. Incorporate climate change scenarios into projects and management actions.	This was performed for the GSP.

Date Received	Commentor	Comment	Responses to Comments
10/31/2021	Russian Riverkeeper	Today, groundwater accounts for approximately 35 percent of the overall sub-basin water supply, however as dry periods increase and surface waters are reduced this percent will likely increase significantly. Because this GSP does not adequately consider future dry years and climate change induced extremes, there is no way to adequately determine future risks and management actions to the necessary degree so that long-term sustainability is achieved. Further, the SRBGSA should look beyond existing plans and studies when making determinations about future water supply and demand as many existing plans also fail to consider future impacts of climate change or pre-date the last significant drought in 2014. Reliance on such plans will only lead to the expansion of future supply gaps that could have been mitigated if climate change had been properly considered in the here and now. p. 13: The (climate change) scenario chosen for this GSP is not representative of our region's future conditions despite there being a fair consensus on this point. The choice to use a wetter model is a risky move when a more conservative and proactive acceptance of our climate future could have only benefited our region long-term. At what point will the GSA accept these changes and reevaluate this GSP? There is no timeline provided other than when "more refined projections become available"—what does that mean though? P. 14: Besides the fact that expectations of future drought scenarios have changed since DWR first published guidance in 2018, the guidance itself encourages groundwater sustainability agencies to analyze the more extreme Dry-Extreme Warming and Wet-Moderate Warming scenarios. This did not happen here and there is no reasonable basis for not following DWR's guidance. Choosing not to consider these scenarios constitutes a failure to consider the best available science and information as required by SGMA.	The GSP accounts for increased dry periods and declining surface waters in a number of ways. First, the the projected baseline scenario accounts for projected climate directly into the groundwater simulation (Appendix 3-E). Municipal demands also account for the projected climate by adjusting (Appendix 3-D) groundwater demands based on yearly precipitation. And finally, surface water reliability under projected climate is accounted for in Section 3 of the GSP and Appendix 3-E. The GSP is a living document, and along with the groundwater model wil be updated a minimum of every five years. Data collected along with sustainable management criteria will be evaluated and transmitted annualy in a report to the state as required by law, and as a result, the GSA will be tracking the direct measurements with the climate projections over time.
10/12/2021	Marshall Behling	We are told by scientists and politicians that we're in a "new normal" when it comes to drought and wildland fires. We can't use the "old normal" to predict the new normal. Please specifically analyze, discuss, and justify your assumptions on rainfall. Failure to do so will cause the public to lose faith in your efforts. Thanks, MB	Please see appendix 3-E. It details the selection process of choosing the global circulation model that projects climate. We did not assume anything about rainfall. The rainfall used in future simulations came directly from these scientifically-sound, sophisticated global circulation models that are internationally recognized and legitimized.

Date Received	Commentor	Comment	Responses to Comments
		The basis for policies and actions in this GSP stem from a 50 year predictive model of 30 years of “normal” rainfall followed by 20 years of severe drought. Such a model is not supported by current Climate Change science, but rather opts for a highly optimistic near-term environment, and a future stress run without consideration of compounding factors. Future conditions are far more likely to be non-linear. That is, precipitation patterns will not reflect historic periods, but rather shift back and forth violently, just as we have seen with this year's severe drying followed by sudden flooding deluge (13” of rainfall total last year, and then10” in the last 48 hours). The basis for such volatility can be found in the increasing loss of temperature differential between the Arctic and temperate North American continent. As this differential diminishes, the dominant jet stream band breaks down to a greater and greater degree, leading to incipient high pressure off the California coast, heat domes, and monsoon precipitation events. It is possible to predict the breakdown of the jet stream by looking at modeling for the loss of Arctic sea ice, which is now expected by the end of this decade. This implies that an assumption of 30 years of “normal” wet years moving forward is wildly optimistic, and misleading as a basis for planning.	There is no assumption that '30 years of normal rainfall' will occur. See appendix 3-E for source of data used in projected model simulations.
		Predictions for groundwater pumping rates for land owners during prolonged drought assume household “efficiencies” comparable to urban residents, and, if need be, mandated monitoring and restrictions on extraction. However, this fails to take into account the larger system impacts such a severe, prolonged drought would have on the residents of Sonoma County. When (not if) we enter a cycle of prolonged drought and heat, agriculture in the Central Valley will also be experiencing equal or greater stress. The precautionary principle must assume not just a local water availability issue, but a collapse in California's water-intensive agricultural sector. In response to diminished supply and increased cost for food, land owners in Sonoma County will be compelled to plant crops or fodder on scale. Intensive food production in our dry-summer climate is extremely water demanding, even with modern technology, and a shift to cropping would result in groundwater pumping far exceeding the models employed in this GSP. Attempts by local government agencies to limit pumping at the cost of a communities ability to feed themselves would lead to rampant social crisis.	Comment noted.

Date Received	Commentor	Comment	Responses to Comments
10/12/2021	Deborah Eppstein	Thank you for all your work on these GSAs. Although I not am a water expert, I am a scientist. As a scientist, I am very concerned that the climate model chosen, predicting wetter weather for the next 20 years, does not reflect best current knowledge concerning hotter drier climate, with significantly more water loss to evaporation-transpiration. Even with a slightly wetter model, predictions are for precipitation to come in shorter, more intense periods during the winter, with much less during the former shoulder periods of spring and fall. Even if greater total precipitation, this pattern causes more runoff and less ground water recharge. Also climate predictions include more intervening years of severe drought which further cause ground water levels to lower, even if they are followed by wetter years. Using only a model that predicts more than average rainfall for the next 20 years is ignoring the science. At very least I recommend that you use a range of options, and prepare for the worst scenario. If updates are made every 5 years, we could be left high and dry (literally) in 5 years if we base our current planning on a wetter next 20 years, but that does not materialize. I have not down an exhaustive search, but for example, see article below by McEvoy et al (2020): Earths Future Vol 8, issue 11 Nov 2020; Projected Changes in Reference Evapotranspiration in California and Nevada: Implications for Drought and Wildland Fire Danger. Daniel J. McEvoy, David W. Pierce, Julie F. Kalansky, Daniel R. Cayan, John T. Abatzoglou. First published: 29 October 2020. https://doi.org/10.1029/2020EF001736 Also, what analysis is being done for all the unincorporated areas that are not within the three GSAs? Both agriculture and cannabis as well as homes use ground and surface water in these areas, and this usage may increase significantly if there is not a solid water availability analysis to guide future permitting. Even the state Department of Cannabis Control has asked the county (through Permit Sonoma) to perform analyses of cumulative impacts of water usage across the entire county, for all water uses, surface and groundwater. NOAA has also requested such. I hope you will commit to revise these GSA's before they need to be submitted, to include additional climate prediction models encompassing less precipitation, greater water loss due to evapotranspiration, and periodic years fo extended drought. This may be the new normal. Thank you for your consideration	The concern that the chosen model "does not reflect best current knowledge" is illogical (see appendix 3-E). The best current knowledge is actually derived, in part, from the chosen model. The chosen model (HadGEM2-ES RCP8.5) is one of the Climate Model Intercomparison Project version 5 (CMIP5) models that was used in the McEvoy et al (2020) listed by the commentor. As such the chosen model is well-founded and defensible. Secondly, the increased evaporative demand referenced by the comment is very well accounted for by the groundwater flow model. The GSFLOW model uses a sophisticated set of computations to account for the impact of increased temperatures on evaporative demand. Similarly the changed hydrologic patterns mentioned by the comment will be well accounted for by the model. Groundwater use outside of the Subassin area have been accounted for in the groundwater model. This includes current and projected ag, rural, and municipal groundwater users.

Date Received	Commentor	Comment	Responses to Comments
10/12/2021	Craig Harrison	I want to provide brief comments on the draft Santa Rosa Plain groundwater sustainability plan. I understand that it contains an assumption that rainfall will be "above average" during the next 20 or so years. Any such assumption must be justified by science. I suspect it is purely an assumption, because so far as I know there are few if any credible projections for decades in the future. As Yogi Berra famously said, "It's tough to make predictions, especially about the future." f I were projecting rainfall over the coming decade, I would be much more inclined to use the rainfall during the past decade rather than the rainfall during the 1970s, 1980, 1990s, or any other prior time. We are told by scientists and politicians that we're in a "new normal" when it comes to drought and wildland fires. Why assume the "old normal" is still the current norm? This element of the plan seems likely to drive most results and policies that will be based on the plans. Unless your assumed rainfall can be justified, I suggest that you do the following. Perform all analyses based on three different scenarios/assumptions: 1. Average rainfall over a designated period. 2. Above average rainfall by a certain percentage over a designated period. 3. Under average rainfall by the same percentage over a designated period. This allows a sensitivity analysis for your results and conclusions. The public and decision makers can readily ascertain the degree to which this assumption drives the results. For results that are the same or nearly the same under all three scenarios/assumptions, you will have confidence that you can made sound policy judgments based on those results. Where the results are different, you will have a clear warning that you do not have a sound scientific basis for policy decisions based on these results. In that event, I suggest that you employ the precautionary principle and take actions to preserve options in the event any optimistic assumptions turn out to be wrong. I ask that your report specifically analyze, discuss, and justify your assumptions on rainfall. Failure to do so will cause the public to lose faith in your efforts. It might be contrary to law. Thank you for your work on this important issue.	See appendix 3-E for details on methodology on future climate used in the GSP. There were no assumptions that climate would be wetter or drier than historical. The output of the global circulations models are basis of future projected model scenarios.
COMMENTS RECEIVED ON AUGUST 2021 VERSION			
9/9/2021	Beth Lamb	There is a lot of good information that is very technical in this section. I found that the color figures were very helpful to explain some very technical information. Seems like this section will need to be updated substantially as new data becomes available especially in the water balance section.	Comment noted
		Section 3.2.5.2 There is starting to be evidence that CrVI is naturally occuring in shallow groundwater in the Santa Rosa Plain	Comment noted - if there is documentation please provide to the SRP GSA.

Date Received	Commentor	Comment	Responses to Comments
9/7/2021	Robert Pennington	Page 3 - "The main channel of Mark West Creek is perennial throughout much of its length (Simley and Carswell 2009), having summer flows maintained by numerous springs near the headwaters. Most of the main channel is in its natural state and much of the riparian vegetation adjacent to the Mark West Creek channel, as well as the creek bed, is undeveloped and characteristic of natural channel conditions."	Comment noted
		Is this true of Mark West Creek within the SRP? I thought there had been dredging and straightening, especially in areas near the confluence with the Laguna.	Not dredging and channeling but diversions - "most" of the main channel is in natural state - In the mid-19th century, lower Mark West Creek flowed northwest across the Santa Rosa Plain to its confluence with the Laguna de Santa Rosa. Between the late-19th century and the mid-20th century, a series of diversions (possibly combined with natural course shifts) caused the channel to move progressively further to the south. Today, the Laguna-Mark West Creek confluence is located approximately two miles south of the historical confluence. (San Francisco Bay Institute)
		It would be useful to identify streams that are listed as critical habitat for threatened and endangered aquatic species.	Comment noted
		7. Page 10 - "However, the continuity of these distinct upper and lower portions is not well constrained nor correlative across the Subbasin ~~due, in part, to the limited number of wells and lithologic information for the deep aquifer system~~." I recommend deleting, as above. More likely, the sedimentary structure is highly heterogeneous, and laterally continuous aquitards simply do not exist. It is unlikely that more well logs could adequately define the 3 dimensional discontinuous layer cake of sands, silts and clays to a resolution needed to define the "shallow" from the "deep" aquifer. Sweetkind (2010) made a great effort to use well logs to characterize the subsurface, additional well logs are unlikely to provide much more information that is of value at the basin scale.	Comments incorporated in part.
		8. Page 10 - "The shallow aquifer system generally is separated from the underlying deep aquifer system by sequences of clay, which form aquitards ~~that predominantly occur in either the lower portions of the Glen Ellen Formation or upper portions of the Petaluma Formation~~, as SECTION 3 — BASIN SETTING Santa Rosa Plain Subbasin GSP Santa Rosa Plain GSP Working Draft 3-11 08162021 evidenced by noted differences in water quality (Martin et al. 2013) and estimated hydraulic properties, such as vertical hydraulic conductivity (Woolfenden and Nishikawa 2014). Generally, hydraulic conductivity is typically 10 to 10000 times lower in the vertical direction compared with the horizontal direction due to anisotropic flow conditions typical of layered sedimentary aquifer systems (Heath. 1983)."	

Date Received	Commentor	Comment	Responses to Comments
		See strike out above. I don't think documented hydro-stratigraphy (Sweetkind et al 2010) support this description, and this appears inconsistent with the Geologic Descriptions and Aquifer System Materials and Properties sub-sections included in the Basin Setting. I don't think there is much evidence for the clay rich layers in lower Glen Ellen or Upper Petaluma. Certainly this could be true in specific areas of the basin, but I don't think a general statement is appropriate. There are clay layers throughout both units. Confinement generally increases with depth as more and more low permeability layers (of varying thickness) are crossed. However, I don't think there is any particular laterally continuous aquitard at 150 to 200 feet.	
		Check the groundwater model for the range of Kh to Kv, I think it is up to 10000, but am not certain.	Comment noted
		Page 15 – "~~Aquitards composed of clay deposits commonly separate the shallow and deep aquifer systems and serve to locally confine the deeper aquifer system to varying degrees causing semiconfined and confined conditions.~~ Clay aquitards are common within some portions of the Quaternary alluvial deposits, such as the basin deposits within the southern portions of the Subbasin, the Glen Ellen Formation, and clay-dominated portions of the older Petaluma Formation, ~~which serve to confine more permeable sand and gravel aquifer zones within the Wilson Grove and Petaluma Formations of the deep aquifer system.~~"	Comment incorporated in part
		I think this section should be redrafted. Confined conditions are often gradational through the shallow aquifer through the deep aquifer. This may result from one confining layer or numerous low permeability layers. Rarely is there evidence for a productive upper aquifer, followed by a discrete confining layer, followed by a productive deep aquifer. More discussion of the complexity and range of potential configurations should be added.	Comment noted - as more data is collected, the GSP can be updated with this information
		Discussion and a map identifying areas where there is low, intermediate and strong evidence for confined deep aquifer conditions would be useful.	Comment noted.
		Page 35 - "Interconnected surface waters are defined in the GSP Regulations as "surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water is not completely depleted." ~~A stream segment is interconnected where (and when) the groundwater water table elevation equals or exceeds the streambed elevation."~~	Alternate definition is incorporated.
		See strike out above. This statement is inconsistent with the preceding definition interconnected surface water, and inconsistent with text lower down in the same paragraph. If groundwater levels must be at or above the stream, then interconnected-losing streams would not be considered interconnected.	The text does not say gaining/neutral streams are an exclusive type of interconnected streams.

Date Received	Commentor	Comment	Responses to Comments
		Page 36 - "Where the shallow groundwater elevation is greater than the stream bottom elevation interconnected surface, water conditions are inferred to occur. Stream bottom elevations were extracted from 2013 Vegmap LiDAR (Vegmap 2013). Where shallow groundwater elevations are lower than the stream bottom, then the stream is inferred to be disconnected from the groundwater system. This analysis does not consider the impact of varying stream stage and assumes that the stream bottom is a reasonable surrogate for stream stage. Points for this category were assigned to give the full 5 points for reaches inferred to be interconnected using this method (negative values) and decreasing to 0 points where groundwater elevations are 10 feet below the stream bottom. **To provide a conservative approach and account for the inherent uncertainties within the datasets, reaches where the groundwater elevation is estimated to be within 10 feet of the streambed were assigned either one or two points depending upon the depth. Figure 3-18a shows the depth-to-water for all of the stream reaches."** The sentence in bold seems to imply that if groundwater elevations were definitively known to be below the streambed, then the stream would be disconnected, which is incorrect.	There exists some critical depth at which point changes in local groundwater elevation does not impact sw/gw exchange. Our scientific basis is that occurs at 10 feet. The sentence implies that if groundwater elevation is 10 feet below streambed, then the stream is disconnected. This may in certain locations be incorrect, but without more data cannot be ruled out as correct/conservative. See sophocleous 2002 for good review.
		Points based methods 1 and 2 give points to reaches that are "gaining", and the methods appear to assume that reaches that are "losing" are disconnected. I find the method problematic for reaches where there is a gaining reach upstream, yet the reach itself is considered disconnected. These reaches are quite likely to be interconnected-losing. One example, evident on Figure 3-18e, is the main stem of Mark West Creek near HWY 101. I understand this reach to have perennial flow, and it is likely interconnected, but has been designated as "Non Interconnected". I recommend all reaches downstream of a reach identified as "interconnected" be designated as interconnected as well.	Identifying losing-interconnected reaches is difficult. Assuming that all reaches below gaining section are interconnected stretches plauisibility due to limited upstream flow to supply cumulative downstream losses. Some streams go dry, especially smaller streams in this region.
		Page 69 - "Although the interannual estimate of groundwater storage both increases and decreases with the most recent cumulative net positive storage occurring in WY 2017, overall the outflows are greater than inflows into the groundwater system, resulting in an estimated decline in groundwater storage in both the historical and current water budget periods. The historical (WYs 1976–2018) annual change in storage is -600 AFY, whereas the current (WYs 2012–2018) annual change in groundwater storage is -2,100 AFY."	First half of statement was removed for lack of clarity
		I suspect there are useful statistics on time series data that could be applied here. That current storage is well within the range of historic storage levels, this seems like a worthwhile point to emphasize. When considering the historic period, it does not appear that there is a significant downward storage trend.	Comment noted

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		Page 70 - “The magnitude of these single-dry year potential shortfalls is estimated to be about 19 percent of average annual demand by 2045. This condition is accounted for in the baseline projected water budget developed for this GSP by assuming higher levels of groundwater demands from Sonoma Water contractors during dry conditions.” This could use a little more description. What is meant by “accounted for”? Does this mean groundwater pumping is increased to offset 19% of the average annual demand during a severe dry year?	This has been addressed in text.
8/18/2021	Wayne Haydon	3.1.2 Surface Water and Drainage Features: Reference Simsley and Carswell, 2009 seems incorrect. Could use a reference for the channel condition. 3.1.3 Soil Characteristics: Text and Figure 3-3a: Not sure what is meant by “variable and unknown textures)”. Most of light pink colored areas on map are Wright Loam WhA. Statement “At locations…recharge.” Should be in another section on Recharge. Quaternary Sedimentary Deposits: Holocene is younger than 11,700 year. 3.1.5 Principal Aquifer Systems and Aquitards: “However, in a few limited areas where these units (shallow aquifer system) are absent or thin near the margins of the Subbasin, the shallow aquifer system locally occurs within sedimentary units of the Wilson Grove and Petaluma Formations.” I think it would be better if we said the shallow aquifer is not present (not exposed) in these limited areas in the Shallow Aquifer discussion, and that the Deep Aquifer is exposed at the surface in these limited areas, but this should be stated in the Deep aquifer discussion. Otherwise, we are saying the Wilson Grove and Petaluma Formations could be either the shallow or the deep aquifer. 3.2.4 Land-Surface Subsidence: “Increases and decreases in stored water cause opposite land surface effects in bedrock versus alluvial areas. Increases in stored water increase this downward force resulting in elastic subsidence in bedrock areas and uplift in alluvial areas, whereas declines in storage release this downward force resulting in elastic land surface uplift in bedrock areas and subsidence in alluvial areas.” My additions and edits are optional and could rewritten better. Could move to line 1136.	Noted - reference corrected Descriptors are directly transcribed from USDA source dataset Comment noted - soil permeability is mentioned in the Groundwater Recharge section and this is a soil characteristic Comment incorporated. "younger than 12,000 years" (Reference: Walker, J.D., Geissman, J.W., Bowring, S.A., and Babcock, L.E., compilers, 2018, Geologic Time Scale v. 5.0: Geological Society of America, https://doi.org/10.1130/2018.CTS005R3C. ©2018 The Geological Society of America) Comment noted. Comment noted. The report referenced (Argus et. al, 2017) is focused on the Sierra Nevada and Central Valley, not the Coast Ranges and coastal basins. Additionally, Figure 1 of the referenced report displays zero meters equivalent water thickness change in the Coast Ranges in the Sonoma County area for the mean seasonal water gain for the period 2006-2016, suggests that there would be zero uplift or

Date Received	Commentor	Comment	Responses to Comments
		Add reference: Argus, D. F., Landerer, F. W., Wiese, D. N., Martens, H. R., Fu, Y., Famiglietti, J. S., … Watkins, M. M. (2017). Sustained water loss in California's mountain ranges during severe drought from 2012 to 2015 inferred from GPS. Journal of Geophysical Research: Solid Earth, 122, 10,559–10,585. Last three sentences of first paragraph: Flesh out the three sentences, reverse order to reflect that aquitard compaction (not collapse) is the greater subsidence cause, aquifer compaction much less cause.	subsidence effect on bedrock, unlike the Sierra Nevada with 0.5-0.75 meters equivalent water thickness change.
		Figure 3-18d needs values in Explanation. Explain why negative numbers. Vegetation GDEs: How did you get "…the following general classifications." I don't find this in the Sonoma County Veg Map. 3.3 Water Budget: General comment: Quite an impressive body of work and a very useful tool for future predictions of conditions and interactions. Question: has the model been run backwards in time to compare simulated conditions versus observed conditions? What verification of the model has been completed. Page 3-51: Figure 3-26 On the "Water Year Type" are the white or clear color bars normal water years? Need to add to Explanation. "The value of the net streambed exchange depends less on year-to-year variability in precipitation, and more on 5- to 10-year (climatic) variability in precipitation." While I don't doubt this statement, Explain how this was calculated, at a glance Water Year Type appears to control inflow/outflow magnitude. Page 3-52: "Figure 3-26 shows net stream inflows and…" This sentence seems out of place and could be an introduction of Figure 3-26. Maybe move to page 3-51 before, "Figure 3-26 indicates that streamflows exiting the Subbasin are…" To Fig 3-26, might add description of what negative and positive values mean. "These dynamics are likely climatically driven, rather than a result of increasing imperviousness." While I don't doubt this statement, Explain analysis that reaches that conclusion. Page 3-65: Explain "Dunnian runoff and interflow" Page 3-69: "If groundwater pumping and climate remain similar to the current period, and groundwater storage declines stabilize, losses from the streambed will become greater and groundwater ET will decrease until inflows equal outflows from the groundwater system." Are we saying in order for groundwater storage declines to stabilize, losses from the streambed must become greater and groundwater ET must decrease? Otherwise, I'm not sure what we are saying.	Comment incorporated The Nature Conservancy GDE vegetation mapping Comment noted Yes, the model has been compared against observed data. overall the model does a good job at simulating groundwater heads and observed streamflows. these results are presented in the model update appendix. Noted in Figure 3-23. Subsequent sentences in text were intended to support the statement. Comment noted. Subsequent sentences in text were intended to support the statement. Comment incorporated - now defined. Correct - text clarified.

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		"The lateral flow of soil water (interflow) and rejected soil water (Dunnian flow) are important soil-zone processes that generate runoff into streams. Hortonian overland flow, which occurs when precipitation rates exceed soil hydraulic conductivity, is another important source of runoff that is not detailed here." Sentence appears out of place, should appear earlier. Page 3-70: "A comparison of the historical water budget and current water budget shows greater stress…agricultural pumping." And " Subbasin boundary inflows and outflows…" Provide reference to graph and tables that show this conclusion. "Surface water-groundwater interactions (net streambed exchange) is controlled more by 5 to 10-year variations in precipitation…" While I don't doubt this statement, Explain analysis that reaches that conclusion, at a glance Water Year Type appears to control inflow/outflow magnitude. 3.3.4 Subbasin Water Supply Reliability: Page 3-70: "For single-dry years, model simulations…" Who's model, the UWMP or GSA? 3.3.5: consider moving these to a more introductory position, perhaps after 3.3.2 3.3.6 Projected Water Budgets: Page 3-77 "A summary of the average fluxes for the historical, current, and projected water budget periods is shown on Figure 3-39." Only shows projected. 3.3.6.3 Climate of the Projected Water Budget Simulation Period: Page 3-74: "The first 20 years of the projected simulation period are relatively wet compared to the historical precipitation. The first 2 years of the projection are dry, but are then followed by a total of 8 wet and 6 very wet years." And 4 normal years? But 3.3.6.7 Projected Water Budget Summary: Page 3-95: "The projected water budget is characterized by an increased average precipitation in the first 30 years of the 50-year simulation." Dp these say the same thing? 3.3.7 Sustainable Yield: Page 3-97: "The 20-year period from WY 2021 to 2040 is used to determine the sustainable yield of the Subbasin. This period is selected based on the following factors: • Representative of long-term conditions: Mix of 6 wet years, 1 very wet year, 1 dry year, 2 very dry years and 10 normal years • The simulated net groundwater storage change during this period is near zero". Questions: 1. how does point one above this compare to what was said in 3.3.6.3 on page 3-74, copied above, about number of wet/dry years? 2. Reference which graph depicts "simulated net groundwater storage change during this period is near zero." Fig. 3-49? Did the model simulate the future (2020-2070) groundwater elevation for the shallow and deep aquifers? If so, where is that data presented?	Comment incorporated. As part of the summary it seems unnecessary to add references to each table and figure. Explanation of analysis for this is presented in 3.3.3.1. The SRPHM. Comment noted. The text should reference figure 8-40 - this has been incorporated. Comment incorporated. Changed to 'elevated' average precipitation. Comments incorporated - corrections made. Data is presented in Appendix 6-A.
8/23/2021	Joe Gaffney	Appendix 3-D: Under "Municipal Demand Water projections," the document should be amended to read: "City of Sebastopol, which is entirely reliant on groundwater pumped from the Santa Rosa Plain Subbasin and the Wilson Grove Formation."	Comment noted. The narrative is focused on wells in the subbasin and not the geological formation.

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8/31/2021	Bob Anderson	P. 13: this is an important statement – needs to be presented more definitively: To characterize the aquifer systems within the Santa Rosa Plain for the purpose of implementing SGMA, two principal aquifer systems have been identified based on available data and information: the shallow and deep aquifer systems	Comment noted. The aquifer systems are presented more definitively in susbequent subsections.
		P.15: this may need to be qualified – assume it refers to Rohnert Park's wells – now changed. The shallow aquifer system generally exhibits stable long-term groundwater levels, while deeper aquifer system wells have exhibited appreciable periods of declining groundwater levels in certain areas of the Subbasin (Santa Rosa Plain Basin Advisory Panel 2014; SRPGMP 2017).	Comment noted. See Figure 3-9b.
		P. 18: Over what years is the data trends? Figures 3-12a and 3-12b	Comment incorporated into figures.
		P. 20: likely important detail re faults and impact on aquifers: The Rodgers Creek Fault appears to act as a barrier to groundwater flow and also creates groundwater upflow or mixing along part of its length (Figure 3-5). The Sebastopol Fault appears to limit the lateral groundwater movement to the east. To the east of the Sebastopol Fault, an unnamed fault is at least a partial barrier to groundwater flow and appears to create upflow or mixing along part of its length (Martin et al. 2013)…. These changes suggest that the fault orientation and activity may be directing groundwater downward and causing deep mixing of older and more recently replenished waters, or may be evidence of groundwater upwelling. The Sebastopol Fault may be acting as a barrier to shallow flow, but does not appear to impede flow at greater depths. Recharge that reaches the deeper aquifer zones is less well-defined and appears to come from a combination of leakage from overlying shallow aquifers and mountain-front recharge along the margins of the valley	Comment noted.
		P. 20: Was this study used for Group 2 Projects? The natural recharge potential map developed by Todd Engineers (Figure 3-6) ranks the very high to very low relative potential for natural groundwater recharge from rainfall infiltration	Yes.
		P. 22: does any of this need to be updated now both Sections 6 & 7 are written? 3.1.8.2 Recharge and Discharge Areas and Mechanisms and Surface Water/Groundwater Interaction Improved understanding of recharge and discharge mechanisms within the Subbasin for both the shallow and deep aquifer systems will support the appropriate selection of projects and actions needed for the Subbasin, this includes: • Gaining an improved understanding of the interconnection of streams to the shallow aquifer system, including seasonal variability and how groundwater pumping can affect streamflow. Additional shallow monitoring wells near stream courses paired with stream gages and meteorological stations can help advance this understanding. • Conducting geochemical or tracer studies, which can help better understand both recharge and discharge mechanisms to both the shallow and deep aquifer systems, as well as surface water/groundwater interaction within the Subbasin.	No.

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		P. 23: which number is one used in the GSP? The yearly average precipitation measured from this station from WY 1903 through WY 2018 is 29.3 inches (Table 3-1), compared with 33.3 inches, as calculated by PRISM.	Both are used (referenced) in the GSP as is explained in the susbequent paragraph. Note this text has been updated to include the updated Table 3-1 data extending to 2020.
		P. 24: Average rainfall = 29.81	
		P. 25: Out of sequence – coming after Figures 3-10 a.b. • Historical groundwater-level contour maps (Figures 3-9a and 3-9b)	Comment incorporated. Narrative has been adjusted for sequence of historical then current.
		P. 26: check the wording: More recent groundwater-elevation contour maps prepared for the GMP and for this GSP separate shallow aquifer system and deeper aquifer system wells to contour the two principal aquifer systems separately. Comparison between the shallow and deep aquifer system groundwater-elevation contour maps indicates that groundwater elevations in the deeper zone aquifers are approximately 10 to 40 feet lower than groundwater elevations in the shallow aquifer system in the Subbasin.	Comment incorporated into revised narrative text.
		P. 30: important detail appears in this – but the charts come at pages 66-67 of 109. 3.2.3 Estimated Changes in Groundwater Storage -- Table 3-11 (Section 3.3.3.2) shows on average, that groundwater storage in the historical period declined by 600 AFY, while it declined by 2,100 AFY in the current period. The average annual results indicate that about 3 percent of pumpage in the basin is supplied by groundwater-storage depletion. The increased rate of groundwater-storage depletion during the recent period appears to be more a result of a drier climate than increased groundwater pumping during that period.	Comment incorporated by standard convention of moving Table 3-11 and Figure 3-33 up to this section and renumbering tables and figures.
		Figure 3-33 (Section 3.3.3.2) shows groundwater pumpage by water-use sector, along with the 5-year moving average of pumpage for the historical period. The peak of the 5-year moving average of the current period (21,000 AFY) is exceeded during 5 years in the 2000 to 2011 period, indicating that total groundwater pumpage for the current period is not greater than the previous 12-year period.	Comment noted
		P. 31: looks as if the Hwy 12 sign is covering the white dot for SRPO496: One PBO GPS station is located within the Santa Rosa Plain Subbasin (Figure 3-14a). This station (SRP0496; P197) has been actively monitored since 2006 and results are shown on Figure 3-14b.	Comment incorporated - monitoring location symbol to be move on top of highway symbol.
		P. 47: Estero de Santa Antonio - should be Estero de San Antonio	Comment incorporated.
		P. 47: Petaluma Valley Subbasin	Comment incorporated.
		P. 49: text says “Subsurface inflows” – Fig 3-22 says “surface”	Both are correct - the Figure 3-22 reference in the text is to geographic location and not type of inflow.
		P. 52: Is it 2071 or 2070? Projected climate based on the selected global circulation model (GCM) will represent WY 2020 through 2071.	WY 2021 through 2070 - text has been corrected.

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		P. 55: what is change in groundwater levels? On average, groundwater discharge to streams exceeds streambed losses, resulting in a net streambed exchange into streams of approximately 300 AFY. WY 2017 is one of the top 3 wettest years in the historical period but still experiences a negative streambed exchange. This is because WYs 2012 to 2016 were all dry or normal precipitation years. Consequently, in the current period there is a negative net streambed exchange of -1,300 AFY. The net combined surface-water outflow from the Subbasin ranges from 47,000 to 1,165,000 AFY	Groundwater level changes are presented in appendix 6A.
		P. 58: Not sure -- appears an explanation is missing for Table 3-6+ (maybe Current?)	Comment incorporated - unlabeled Table labeled Table 3-7.
		P. 78: what was the number used for population growth for Municipal? Projected groundwater pumping assumptions and modifications Municipal, rural domestic, and industrial projected water uses are simulated using the WEL package. These uses are defined on a monthly basis and incorporate the projected population growth and associated groundwater demands.	Not a simple population growth projection as different municipalities used different assumptions to estimate demands over time, which were then extraploated out to 50 years - see Appendix 3D.
		P. 78: what was the annual precipitation after 2040? Climate of the Projected Water Budget Simulation Period. The first 20 years of the projected simulation period are relatively wet compared to the historical precipitation. The first 2 years of the projection are dry, but are then followed by a total of 8 wet and 6 very wet years. In this period, the average precipitation is 35.6 inches per year, which is 20 percent greater than the historical average. Average 2021-2070 = 31.8 in.	Please refer to Figure 3-37.
		P. 82: this says Figure 1-1 – believe it may instead be Figure 3-22. Surface Water inflow and Outflow: Subregion and Stream Names on page 48 of 109. Figure 3-41 and Figure 3-42 illustrate the net boundary inflows and outflows for each of the HUC 12 watershed areas, and the streams that drain them. The locations and extents of the watersheds is shown on Figure 1-1.	Comment incorporated - reference to watersheds changed to subregions.
		p. 82-83: Text cites to “subsurface inflows – except Figure 3-22 = Surface Water inflow and Outflow: Subregion and Stream Names – page 48 of 109	This is actually surface inflows.
		P. 86: typo - For the entire projection from WY 2021 to 2070 (Table 3-233),	Typo corrected.
		P. 87: what is ASR – gets a color but not included in Figure 3-45?	Correct.
		P. 100: Petaluma Valley Subbasin	Text corrected.
		P. 101: The average total groundwater pumpage for this period is 23,900 AFY, which is defined here as the sustainable yield (Figure 3-54). This value is 39 percent of the total groundwater inflows into the subbasin, and is greater than the average total groundwater pumpage experienced during the current water budget period.... Minimum thresholds for depletion of interconnected surface water will be further refined during the five-year GSP update. As such the sustainable yield does not fully account for the impact of basin-wide pumpage on surface-water depletion	Comment noted.
		P. 109: APPENDIX : http://santarosaplaingroundwater.org/wp-content/uploads/SRPGSP-SMC_SECTION-4_08192021_Final.pdf	Comments noted and text revised.

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		P. 5: Note to Readers: The following information on Sustainability Goal will be reviewed updated when the GSP is completed Note: The list of projects and actions will be included here once finalized. Description of how the sustainability goal will be achieved: Note to Reader: The effects of the projects and actions will be included here in final version of Draft GSP.	
COMMENTS RECEIVED ON APRIL 2021 VERSION			
5/10/2021	Susan Harvey	Thanks for the opportunity to read this section of the plan. A lot of it is very technical, but I thought a lot of effort was made to bridge the gap for the lay person, like me. There were a few things that I had questions about. I tried to copy the text and list the lines.	Comment noted.
		lines 1019 – 1021: Six active or emergency/standby municipal production wells (five of these are completed within the shallow aquifer system and one is completed within the shallow aquifer system	Comment incorporated. Six active or emergency/standby municipal production wells (five of these are completed within the deep aquifer system and one is completed within the shallow aquifer system).
		Both of the five and the one say "within the shallow aquifer system". Should one of these say something different?	No. the first bullet referes to City of Santa Rosa muncipal wells, and the second bullet refers to shallow private wells for monitoring.
		lines 1350 – 1352: Areas of elevated arsenic concentrations are most notable in the northeaster portions of the Subbasin, immediately south of the city of Santa Rosa, in the vicinity of the city of Sebastopol and along the Trenton Fault near Mark West Creek.	Text corrected to say "northeastern." The sentence refers to four different geographic areas, and the northeastern part of the basin is one the four areas.
		First, should that be "northeastern"? Second, I was confused since it said northeastern and then talked about south and kinda west of Santa Rosa	
		lines 1589 – 1590: and the following representatives from the following groups: This spoke to following representative, as in the names of the folks from these groups, but no names were listed. I was thinking if there was no intent to list the names, maybe it should say "and representatives from the following groups"	Comment incorporated.
5/6/2021	Mark Grismer	Have reviewed the chapter 3 info and found no substantial issues – these will arise I suspect more so as we try to set thresholds and propose projects that may involve reductions in GW use	Comment noted.
5/24/2021	Matt O'Connor	3-10a & 3-10b & pg 23: Groundwater elevations shown for shallow and deep aquifers appear to be similar. In east Rohnert Park, shallow aquifer elevations are considerably lower than deep aquifer elevations. This convergence of groundwater elevations should be discussed; at face value it may call into question whether these aquifers are distinct from one another. The discussion of these figures on page 23 says the deep aquifer elevations are approximately 10-40 ft lower...	Hydrogeologic data and hydrographs are more suitable for separating out hydrogeologic differences and the deep and shallow hydrographs show clearly different response patterns suggesting hydrostratigraphic separation.

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		P. 25, line 1019-1021 two subgroups of wells both identified as shallow aquifer	Comment addressed - this was a typo.
		P. 35 Surface water conditions in upper Mark West Creek (above Quietwater Road) have been simulated for a 10-year period (2010-2019) and calibrated at stream gages, notably the Michele Way gage operated by Sonoma Water) by O'Connor Environmental Inc study of Mark West Creek. OEI developed rating curve for Michele Way 2018-2019. These are the only streamflow data for upper Mark West Creek that are available and given the limited data available of this type, it seems worth at least some mention.	Comment noted. Comparison of assumptions, input datasets and output from OEI modeling in upper Mark West Creek watershed will be compared with data and assumptions from the SRPHM during GSP implementation.
		Fig. 3-18b: OEI modeling for Upper Mark West Creek can be compared with respect to gaining stream conditions	Comment noted. Comparison of assumptions, input datasets and output from OEI modeling in upper Mark West Creek watershed will be compared with data and assumptions from the SRPHM during GSP implementation.
		Fig. 3-18c: units of cubic ft per day may not be best choice; data for upper Mark West Creek can be directly compared to OEI modeling	Comment noted. Comparison of assumptions, input datasets and output from OEI modeling in upper Mark West Creek watershed will be compared with data and assumptions from the SRPHM during GSP implementation.
		Fig. 3-6: Relative recharge potential map; a similar but finer scale hydrogeologic model prepared for the upper Mark West Cr watershed found substantially different spatial distribution of predicted groundwater recharge. The model prepared by O'Connor Environmental Inc. for Coast Range Watershed Institute and Sonoma RCD, funded by State Wildlife Conservation Board grant, is focused entirely upstream of the SRP groundwater basin, so it isn't clear whether a different representation of groundwater recharge in the upper watershed would have much effect on recharge of the SRP basin by Mark West Creek. The OEI model also predicts surface water discharge from upper Mark West watershed to the SRP sub-basin, and that data might be the most important for a comparison of the two models.	Comment noted. Comparison of assumptions, input datasets and output from OEI modeling in upper Mark West Creek watershed will be compared with data and assumptions from the SRPHM during GSP implementation.
		P. 18: Sec 3.1.7 discusses a qualitative ranking of groundwater recharge potential in the sub-basin based on a study by Todd Engineers 2012. How does Todd's study relate to groundwater recharge calculated by the USGS GSFLOW model? Doesn't the model provide estimates of groundwater recharge? This section is written to describe the principal aquifers per SGMA requirements, so this treatment of the topic might seem reasonable, but it seems inconsistent with the fundamentals of the model-driven estimates of recharge. It is misleading in that way.	Comment noted. Comparison of assumptions, input datasets and output from OEI modeling in upper Mark West Creek watershed will be compared with data and assumptions from the SRPHM during GSP implementation.

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		p. 19: Sec 3.1.8 regarding uncertainty references a "hydrogeologic conceptual model" that up this point in the chapter hasn't been a focus. I don't dispute that this section is about a conceptual model in some sense, but at this point I thought it was describing the aquifer descriptions for shallow and deep per SGMA requirements	The section 3.1 HCM covers all the components of the HCM as required in the SGMA GSP Regulations § 354.14
		p. 19: Sec 3.1.8 regarding uncertainty and data gaps. I think additional items not noted in this list that would be appropriate include 1. aquifer parameters whether shallow v deep or by aquifer material type; a wide range of aquifer materials are present with a wide range of T & S estimates and this high variability is somehow integrated in the conceptual model for shallow and deep aquifers, 2. groundwater recharge rates are primarily estimated; reference to other modeling efforts in the region that develop estimates of groundwater recharge rates could help characterize uncertainty 3. uncertainty regarding boundary inflows from other groundwater basins is acknowledged, this is an opportunity for the report to implicitly or explicitly identify particular discussions about the western basin boundary with the Wilson Grove Formation; there is both monitoring data from the Sebastopol area and groundwater model estimates from another regional model by O'Connor Environmental Inc. prepared for Gold Ridge RCD and funded by State Fisheries Restoration Grant Program. 4. Groundwater use is estimated by appropriate methods, but is nevertheless uncertain and it should be acknowledged so that there may be ongoing	Section 7.2.4 of the GSP identifies these as additional data gaps and identifies studies, information gathering and additional monitoring planned to address the data gaps.
		pps. 4&5: description of the subject basin in 3.1.1 is confused by apparently inconsistent reference to sub-basins referenced in Nishikawa 2013.	Comment addressed with consistent terminology.
		p. 6: sec 3.1.3 references "Soil Survey Staff, 2021". What was the new information brought forth in the past 4 months and how does it relate to the hydrologic model parameters?	This reference has been removed.
		p. 7: sec 3.1.4 more subbasin references...seems like this is describing the SRP basin study area as a sub-basin.	The Santa Rosa Plain is a "subbasin" as legally defined by DWR in Bulletin 118.
		p. 13: sec 3.1.5 I think it should be acknowledged that distinctive hydrogeologic characteristics of different geologic formations could be expected to be an alternative and possibly superior approach to defining aquifers simply as shallow and deep. The selection of shallow and deep aquifers to represent aquifers is justifiable owing to the limited available data to describe aquifers based on geologic materials (i.e. aquifer hydraulic parameters) and owing to the complex and novel requirements of SGMA. There is a substantial component of fundamental practicality and simplification that motivates the conceptualization of shallow & deep aquifers.	Comment noted.

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5/19/2021	Bob Likins	Here in Section 3 you talk about Water Budgets ..... I recall that at the early public meetings a year or two ago a lot of people were upset at the prospect of being charged for their water wells. My strong recommendation is that throughout this entire report you change your terminology and when you are talking about water usage or water allocation you use terms like that and not use the term "budget" until you get to the place where you are talking about money. And be very clear throughout the report to differentiate between the water use and the GSA administration budget/cost of administering the water use program being developed. Additionally, the clarity in terminology will be helpful when you talk about water usage and water recharge ..... that is taking water away from the general supply and adding water to the general supply. And when you talk about any dollar charges to users for using the supply and dollar credit to users for owning, caring for and paying taxes on land which is not covered with impervious surface and thereby adds to the general supply. It may have been mentioned once that it is tough to give recharge credit, but despite that, it is very important that it be done, understanding that it will involve many assumptions and approximations. Additionally, some may think that the length of time it takes surface water to get to the aquifer is an issue but it is not. W whether a rainfall benefits users tomorrow or in 50 or 100 years it still benefits them thanks to current land owners who provide surfaces of land that can absorb rainfall	Comment noted. The terminology 'Water budget' is required by law - see SGMA GSP Regulations §354.18. Water Budget
5/19/2021	Wayne Haydon	Line 178-179: Reference Simsley and Carswell, 2009 seems incorrect. Could use a reference for the channel condition. Line 198-199: Reference Simsley and Carswell, 2009 seems incorrect. Line 217-218: Reference Simsley and Carswell, 2009 seems incorrect. Line 232 and Figure 3-3a: Not sure what is meant by "variable and unknown textures)". Most of light pink colored areas on map are Wright Loam WhA. Line 251-253: Statement "At locations…recharge." Should be in another section on Recharge. Line 339-340: Reference Sweetkind et al. 2011 or 2013? Line 375: permeability or hydraulic conductivity? Line 377-382: no discussion of permeability or hydraulic conductivity. Line 387: Holocene is younger than 11,700 year. Line 430: could use a reference.	Comment incorporated. "Simley and Carswell, 2009" Comment incorporated. "Simley and Carswell, 2009" Comment incorporated. "Simley and Carswell, 2009" Source is USDA soils dataset. Comment noted - soil permeability is mentioned in the Groundwater Recharge section and this is a soil characteristic. Comment incorporated - 2013. Sweetkind references clarified. Comment noted. Comment incorporated. "younger than 12,000 years" (Reference: Walker, J.D., Geissman, J.W., Bowring, S.A., and Babcock, L.E., compilers, 2018, Geologic Time Scale v. 5.0: Geological Society of America, https://doi.org/10.1130/2018.CTS005R3C. ©2018 The Geological Society of America) Comment incorporated. (Nishikawa et. al, 2013)

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		Line 478-480: "However, in a few limited areas where these units (shallow aquifer system) are absent or thin near the margins of the Subbasin, the shallow aquifer system locally occurs within sedimentary units of the Wilson Grove and Petaluma Formations." I think it would be better if we said the shallow aquifer is not present (not exposed) in these limited areas in the Shallow Aquifer discussion, and that the Deep Aquifer is exposed at the surface in these limited areas, but this should be stated in the Deep aquifer discussion. Otherwise, we are saying the Wilson Grove and Petaluma Formations could be either the shallow or the deep aquifer.	Comment noted.
		Line 509-511: "Hydraulic conductivity…" start sentence with "In general". Otherwise, is reads like we are talking specifically about these geologic units	Comment noted.
		General comment: We state the formations properties, like thickness, lithology, confinement, etc. in several places. Could we reduce the repetition?	Comment noted.
		Line 640: Boron has been a COC	Comment noted.
		Line 684-688: Reads like we are grouping together the QAD and GEF as basin deposits. How about, "Clay aquitards are common within some portions of the Quaternary alluvial deposits, such as in the southern portions of the Subbasin and in the Glen Ellen Formation…"	Comment noted and text modified.
		Line 717-719: Figure 3-5 does not depict that "The Rodgers Creek Fault…" just the faults location. How about adding a previous sentence, "Fig 3.5 depicts fault locations in the subsurface."?	Comment noted and text modified.
		Line 728-730: or might suggest upflow of water from deep aquifers. Is there evidence either way?	Comment noted and text modified. Currently this is a data gap.
		Line 739-742: "Recharge that reaches the deeper aquifer zones… mountain-front recharge along the margins of the valley." Are we discussing where the shallow and deep aquifers are connected without sufficient separating aquitards? And/Or where the deep aquifer is exposed at the surface i.e., Wilson Grove or Petaluma formations? Like in the Block Diagram "Understanding Recharge and Our Groundwater Basins " Explain.	
		Line 771: Figure 3-7, don't see all the springs mentioned in text, where are NHD Springs. Also, there is a lot of information on this figure, but not discussed in this section. Should we make this a figure without Interconnected Streams and Water, include Springs only? Possibly make another Figure with Interconnected Streams and Water to be presented in a later section.	
		Line 981-992 and Figure 3-12a and b: In Explanation can we leave out parenthesis around numbers? Box in Map, does "<+- ft/yr change" depict "+/- .99" in Explanation? If so, should have consistent naming and fill coloring (probably white, grey would be lost in grey map background).	

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		Line 1002-1121: We should state consistently they are depicted on Figure 3-13a, and state consistently Figures for Hydrographs. In reference to GWL cycles, we repeatedly say, "…responses to pumping cycles…" and "…wells were operating relatively continuously…" Do we show pumping cycle dates/time somewhere, what data was used to determine GWL are, "…responses to pumping cycles…", example Line 1093?	Comment noted and text modified. Pumping cycles and data are not included; rapid groundwater level changes in monitoring wells are considered responses to a nearby pumping well; other possible causes are equipment maintenance, earthquakes, or precipitation events in shallow wells along streams.
		Line 1116: "…monitoring wells respond rapidly to precipitation events and changes in streamflow in…." Do we present streamflow data to confirm this conclusion?	Yes -
		Line 1132: "**Increases and decreases in stored water cause opposite land surface effects in bedrock versus alluvial areas**. Increases in stored water increase this downward force resulting in **elastic subsidence in bedrock areas and uplift in alluvial areas,** whereas declines in storage release this downward force **resulting in elastic land surface uplift in bedrock areas and subsidence in alluvial areas.**" My additions and edits are optional and could rewritten better. Could move to line 1136. Add reference: Argus, D. F., Landerer, F. W., Wiese, D. N., Martens, H. R., Fu, Y., Famiglietti, J. S., … Watkins, M. M. (2017). Sustained water loss in California's mountain ranges during severe drought from 2012 to 2015 inferred from GPS. Journal of Geophysical Research: Solid Earth, 122, 10,559–10,585. https://doi.org/10.1002/2017JB014424	Comment noted. The report referenced (Argus et. al, 2017) is focused on the Sierra Nevada and Central Valley, not the Coast Ranges and coastal basins. Additionally, Figure 1 of the referenced report displays zero meters equivalent water thickness change in the Coast Ranges in the Sonoma County area for the mean seasonal water gain for the period 2006-2016, which suggests that there would be zero uplift or subsidence effect on bedrock, unlike the Sierra Nevada with 0.5-0.75 meters equivalent water thickness change.
		Line 1136-1140: Flesh out the two sentences, reverse order to reflect that aquitard compaction is greater subsidence cause, aquifer compaction much less cause.	Comment noted.
		Line 1179: Figure 3-14d?	Comment incorporated.
		Line 1183: Figure 3-14d and e?	Comment incorporated.
		Line 1191: Figure 3-14c?	Comment incorporated.
		Figure 3-15a thru c, and h, Fault mapping only extends north to Mark West Creek.	Comment incorporated.
		Line 1307-1323: Explain meteoric water line and have figure with described data.	Comment incorporated.
		Line 1372: where "SC" described?	Comment incorporated.
		Line 1448: Can we add why we are addressing Surface water.	Comment incorporated.
		Line 1470: Need reference for 80,000 acre feet.	Comment incorporated.
		Line 1473-1474: "…the component of the hydrograph that persists without precipitation…" Can we change "hydrograph that persist" to "streamflow". Easier to understand.	Comment incorporated.
		Line 1486-1488: explain gain-losing refers to stream flow.	Comment incorporated.
		Line 1499: Include stream flow elevation or stream stage. Line 1519-1520: Why ignore stream flow elevation (stage) over time? Not enough stream flow/elevation data? If so, say this. See Line 1532-1533. Streamflow discharge and elevation is being simulated as described in Line 1537.	Need to add more explanation and rationale for not using stream stage - not just line 1519-20 "This analysis does not consider the impact of varying stream stage and assumes that the stream bottom is a reasonable surrogate for stream stage" - explain why

Date Received	Commentor	Comment	Responses to Comments
		Line 1493: Need to add "Winters, et al, 1998" to references.	Comment incorporated.
		Line 1505: flesh out rationale for "scoring system."	Comment incorporated.
		Line 1531: "2000 to 2010" why these years? GWL is for 2015. Also, "…simulated **groundwater** head…"	2000 to 2010 was selected to represent the most recent simulated conditions by the model at the time the analysis was performed in order to incorporate multiple water year types in the analysis.
		Line 1532-1533: "The values range from 0 – 100%, where 0% indicates that the stream **stage** is always greater than the groundwater elevation…" Stage or stream bed elevation? See comment above for Line 1499.	Stream stage is what was used in order to assess gaining vs losing stream conditions.
		Line 1537: …median discharge… Figure 3-18c says Median Flow. We should be consistent. Both should say "stream", I prefer discharge.	Comment noted. Changed text to be consistent with figure
		Line 1545: what is "…cell top…"? describe. Is this elevation.	The elevation of the cell top does correspond to a specific elevation within the model.
		Figure 3-18d needs values in Explanation. Explain why negative numbers.	The more negative the values shown on the figure correspond to higher rates of surface leakage
		Tables not included to be reviewed.	Comment incorporated.
		Line 1617-1619: add this to references.	Comment incorporated.
		Line 1624: "In Sonoma Valley…"??	Comment incorporated.
		Line 1628-1633: Is "Sonoma County Veg Map" really "Watershed Sciences Inc., 2016"?? How did you get "…the following general classifications." I don't find this in the Sonoma County Veg Map.	Work group presentation materials added to Appendix 4-C address this question.
5-19-2021	Bob Anderson	Page 6 line 213: Santa Rosa Creek, which is not included in the Laguna de Santa Rosa drainage subbasin, is the largest tributary to the Laguna de Santa Rosa.	Comment incorporated.
		Page 6 line 228 – mixing Subbasin / SRP watershed: Soil types and characteristics in the **Subbasin** and surrounding watershed have been mapped by the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS), which developed a spatial database of soils for the entire United States (the Soil Survey Geographic Database or SSURGO) (U.S. Department of Agriculture, 2007). The SSURGO database defines 17 different soil textures (excluding variable and unknown textures) present in the SRP **watershed** (Soil Survey Staff, 2021), which are shown on Figure 3-3a.	Comment incorporated.
		Line 233: The majority of the **valley floor** is characterized by clayey soils and loams with gravelly and cobbly loams and more prevalent along alluvial fans and hilly areas. The southern portions of the **Subbasin** are characterized by much more clayrich soils. Gravelly and sandy soils are primarily limited to the low hills in the southwestern portions of the Subbasin and the western portions of the SRP watershed outside the Subbasin and along narrow stream channels within the Subbasin.	Comment incorporated.

Date Received	Commentor	Comment	Responses to Comments
		Page 11 line 412 – don't see Healdsburg Area Subbasin on Figure 3-4: The northwestern boundary of the Subbasin generally follows the contact between the Glen Ellen Formation and Quaternary alluvial deposits of the Russian River Valley within the Healdsburg Area Subbasin (Figure 3-4).	Comment incorporated.
		Page 12 line 493: In areas where multiple permeable zones occur within the deep aquifer system, these different zones can sometimes exhibit distinct features (e.g., distinct water quality signature or appreciable differences in hydraulic head) and can generally be further subdivided into upper and lower aquifers. However, the continuity of these distinct upper and lower portions is not well constrained nor correlative across the Subbasin due, in part, to the limited number of wells and lithologic information for the deep aquifer system. In areas where data is available, distinctions between the upper and lower portions of the deep aquifer system are discussed in this GSP	Comment incorporated.
		Page 14 Line 567: Within the SRPW, yields from wells that are completed only in alluvial deposits ranged from 1 to 650 gpm. The highest well yields are in the northern Subbasin near Mark West Creek (Sweetkind et al., 2013).	Comment incorporated.
		Page 15 line 594: Within the SRP watershed, most wells screened partially or totally in the Wilson Grove Formation are within the upper stratigraphic horizons, which are coarser grained and more permeable than deep deposits to the west. Domestic wells drilled into the Wilson Grove Formation yield on average about 20 gpm (California Department of Water Resources, 1979). Large capacity and municipal wells can yield up to 1,000 gpm or more (Sweetkind et al., 2013). Wells drawing from the Wilson Grove Formation have estimated specific yields in the range of 10 to 20 percent (Herbst et al., 1982), higher than any of the other rocks or sediments in the Subbasin.	Comment incorporated.
		Page 16 line 643: Specific conductance, chloride, total dissolved solids, nitrate, and arsenic are considered waterquality constituents of potential concern in the **SRP watershed** because some samples from wells exceeded state or federal recommended or mandatory regulatory standards for drinking water. In general, groundwater within the **Subbasin** is of mixed cation-bicarbonate type	Comment incorporated.
		Page 16 line 673: in the tidal marshland areas,	Comment incorporated.
		page 17 line 710: Faults in the **SRP watershed** serve as major structural boundaries for geologic formations, the **Subbasin** and groundwater movement.	Comment incorporated.
		Page 19 line 770: Based on USGS' National Hydrography Dataset and National Water Information System, there are 28 mapped springs and seeps in the SRP watershed, (Figure 3-7).	Comment noted.