



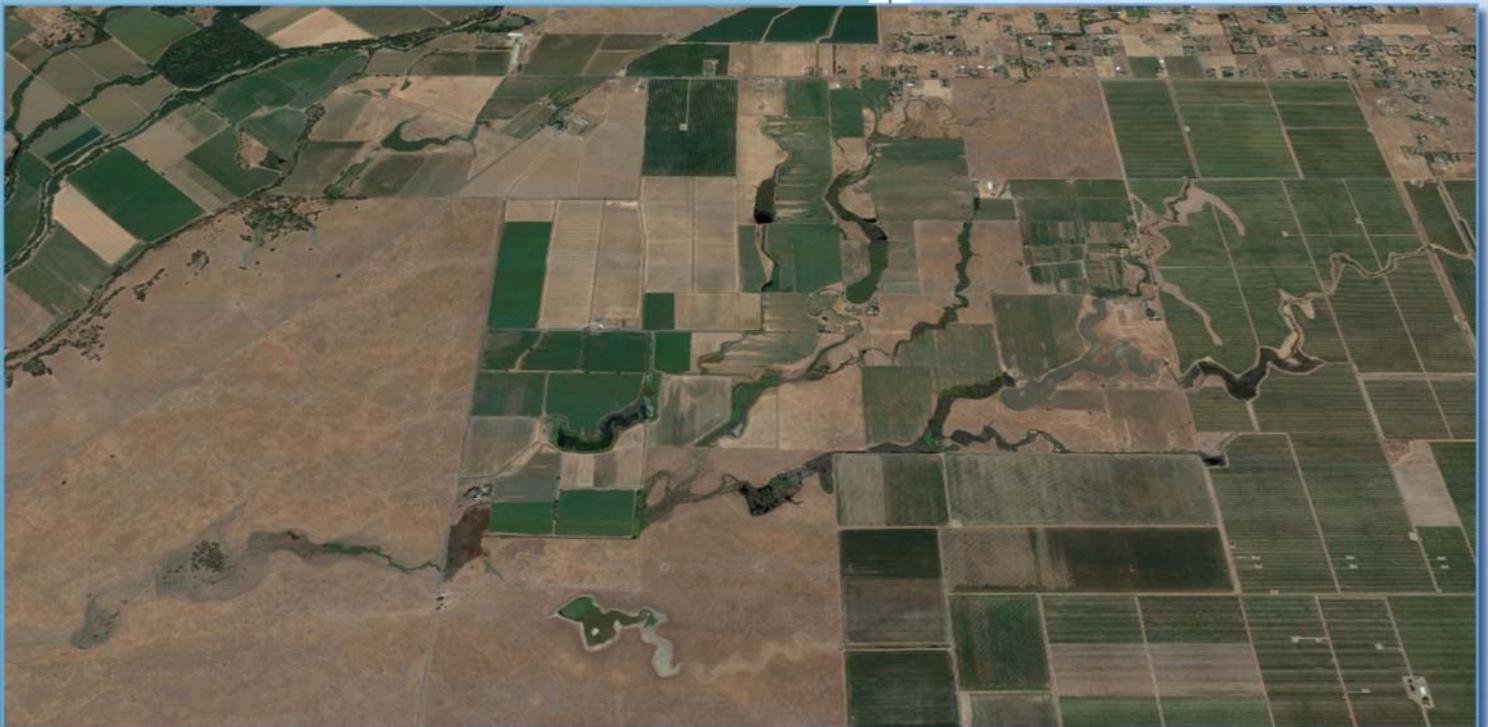
CALIFORNIA STATEWIDE GROUNDWATER ELEVATION MONITORING (CASGEM) NETWORK PLAN

Prepared for

Southeast Sacramento County
Agricultural Water Authority



Prepared by



April 2017

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TABLE OF CONTENTS

- 1.0 INTRODUCTION.....1**
 - 1.1 CASGEM Goal.....1
 - 1.2 CASGEM Program Complements Other Monitoring Programs1
 - 1.3 SSCAWA Monitoring Entity.....1
- 2.0 SOUTHEAST SACRAMENTO COUNTY AREA2**
 - 2.1 DWR Basins and Subbasins and Area Covered by this Plan2
 - 2.2 Geology and Groundwater Resources2
- 3.0 GROUNDWATER MONITORING3**
 - 3.1 Plan Area Groundwater Level Monitoring.....3
 - 3.3 Current Groundwater Conditions.....4
- 4.0 CASGEM MONITORING NETWORK AND PROGRAM5**
 - 4.1 Selected Wells for CASGEM Program5
 - 4.2 Field Methods5
 - 4.3 Monitoring Schedule6
 - 4.4 Groundwater Elevation Data Management and CASGEM Data Submittal6
- 5.0 MONITORING PLAN RATIONALE.....6**
 - 5.1 Address Data Gaps and Future Efforts7
- 6.0 REFERENCES.....8**

APPENDICES

| | |
|------------|--|
| Appendix A | Memorandum of Understanding and Agreement for Cosumnes Subbasin Groundwater Monitoring Association and Cost-sharing for Development and Implementation of CASGEM Program |
| Appendix B | CASGEM Well Information |
| Appendix C | Procedure for Measuring the Depth to Water in Monitoring and Production Wells |

TABLE

| | |
|-----------|---|
| Table 3-1 | Well Information, CASGEM Program Wells with Measurement Frequency |
|-----------|---|

FIGURES

| | |
|------------|--|
| Figure 1-1 | SSCAWA Boundary and Cosumnes Groundwater Subbasin Boundary |
| Figure 2-1 | Surficial Geology and Cross-Section Location Map |
| Figure 2-2 | Geologic Cross-Section A-A' |
| Figure 3-1 | Current Groundwater Level Monitoring Well Location Map |
| Figure 3-2 | Aquifer Designation for CASGEM Network Wells |
| Figure 3-3 | Areas for Additional CASGEM Network Wells |
| Figure 3-4 | Water Level Hydrographs, CASGEM Network Wells |
| Figure 3-5 | Water Level Hydrographs for Paired Wells |

1.0 INTRODUCTION

The Southeast Sacramento County Agricultural Water Authority (SSCAWA) is located in the southeast portion of Sacramento County, and is comprised of three public agencies: Omochumne-Hartnell Water District, Galt Irrigation District, and Clay Water District. In 2002, these districts formed a Joint Powers Authority to develop, implement, and manage the water resources available to them.

This document describes the development of a California Statewide Groundwater Elevation Monitoring (CASGEM) Network Plan which covers the area of the Cosumnes Subbasin that does not include the Omochumne-Hartnell Water District (OHWD), as the OHWD area is presently covered by another CASGEM Monitoring Entity.

1.1 CASGEM Goal

In November 2009, Senate Bill SBX7-6 mandated that the groundwater elevations in all basins and subbasins in California be regularly and systematically monitored with the goal of demonstrating seasonal and long-term trends in groundwater elevations. In accordance with the mandate, the California Department of Water Resources (DWR) developed the California Statewide Groundwater Elevation Monitoring (CASGEM) program. DWR is facilitating the statewide program which began with the opportunity for local entities to apply to DWR to assume the function of regularly and systematically collecting and reporting groundwater level data for the above purpose. These entities are referred to as Monitoring Entities. The legislature added a key aspect to SBX7-6, which was to make certain elements of the groundwater level information available to the public.

1.2 CASGEM Program Complements Other Monitoring Programs

Wells designated for inclusion in the CASGEM program are for purposes of measuring groundwater levels on a semi-annual or more frequent basis that are representative of groundwater conditions in the state's groundwater basins and subbasins. The wells selected by a designated Monitoring Entity may be a subset of other wells monitored by that entity and need not be inclusive of the designated entity's entire monitoring network. Thus, the CASGEM program complements other pre-existing programs that have been developed throughout California by water districts, agencies, municipalities, counties, and others for purposes of understanding, managing, and sustaining groundwater resources.

1.3 SSCAWA Monitoring Entity

SSCAWA has developed a "voluntary cooperative groundwater monitoring association" for purposes of becoming a CASGEM Monitoring Entity; Appendix A contains the signed Agreement among the entities (including SSCAWA, the County of Sacramento, and the City of Galt) that are participating as the Monitoring Entity.

SSCAWA applied to DWR on December 26, 2010 to become the Monitoring Entity for the SSCAWA jurisdictional area within the Cosumnes Subbasin (Plan area) and as part of this Plan proposes to

designate wells for monitoring and reporting groundwater elevations for purposes of the CASGEM program. As described in this CASGEM Network Plan (Plan), SSCAWA has identified the wells to be included in the monitoring program network as required by DWR. The Plan area roughly encompasses 205 square miles in the Cosumnes Subbasin (Figure 1-1). Groundwater use in the region is made up of a variety of users, including agricultural and domestic uses.

This Plan contains the recommended components outlined by DWR, including a summary of the geology and groundwater resources in Southeast Sacramento County. This Plan also identifies the planned CASGEM well network, the rationale for the selection of the wells, the field methods, and the monitoring schedule.

2.0 SOUTHEAST SACRAMENTO COUNTY AREA

2.1 DWR Basins and Subbasins and Area Covered by this Plan

The Cosumnes Subbasin (groundwater basin number: 5-22.16) is about 330 square miles and lies within the San Joaquin Valley Groundwater Basin; DWR has ranked it as a medium priority. Its boundaries are defined by the areal extent of unconsolidated to semi-consolidated sedimentary deposits that are bounded on the north and west by the Cosumnes River, on the south by Dry Creek and Mokelumne River (Sacramento and Amador County lines), and on the east by consolidated bedrock of the Sierra Nevada Mountains. The Cosumnes Subbasin underlies the cities of Galt and Rancho Murieta and is pumped extensively for local agricultural and municipal uses. The basins and subbasins are generally defined based on boundaries to groundwater flow and the presence of water-bearing geologic units. The groundwater basins defined by DWR are not confined within county boundaries. The SSCAWA CASGEM Monitoring Plan includes only parts of the Cosumnes Subbasin (in Sacramento County) and extends from the Sacramento Central Groundwater Authority's administrative boundary near the Cosumnes River to the north and west, the Amador County boundary to the east, and the Sacramento County boundary to the south (Figure 1-1). The Cosumnes Subbasin boundary in Figure 1-1 represents the DWR final draft boundary last updated September 16, 2016 and includes the approved basin boundary modification (<https://gis.water.ca.gov/app/bbat/>). DWR states that this information is "draft until publication of B118 Interim Update 2017".

2.2 Geology and Groundwater Resources

The Cosumnes Subbasin, for which the SSCAWA is a portion, has been reported on by federal, state and local entities, including the U.S. Geological Survey (USGS), United States Bureau of Reclamation (USBR), DWR and various hydrogeologic consulting firms as contracted by local municipalities for local investigations. Annual precipitation within the subbasin ranges from approximately 15 inches on the west to about 22 inches on the east (DWR, 2003).

The Sacramento Valley has had tectonically subsiding sedimentary deposits through most of Cenozoic time. Within these sedimentary deposits, fresh groundwater extends to an elevation of -3,000 feet mean sea level (msl) along the axis of the basin.

Recharge of the alluvium comes from direct percolation of rainfall and return flows of applied water by agricultural and municipal users. The Cosumnes River is a major source of groundwater recharge for the South Basin area (Robertson-Bryan, Inc.(RBI), 2011), and other creeks (e.g., Deer, Badger, Laguna, and Dry Creeks) also contribute to recharge. Flows on the Cosumnes River are unregulated and result primarily from winter storms and seasonal snowmelt. Additional recharge occurs along the eastern boundary of Sacramento County at the transition point from the consolidated rocks of the Sierra Nevada to the alluvial-deposited basin sediments (SCGA, 2012).

The geologic formations that contain groundwater in the Cosumnes Subbasin are described in the South Basin Groundwater Management Plan (RBI, 2011), local investigations for the Sacramento County Water Agency (LSCE, 1998), and the City of Galt (LSCE, 1988), and summarized below. A surficial geology and cross-section location map and a generalized geologic cross-section (A-A') are shown in Figures 2-1 and 2-2, respectively.

Floodplain Deposits and Riverbank Formation: A younger alluvium layer that includes recent sediments deposited along the channels of active streams along the Cosumnes River, Deer Creek, and Dry Creek. The younger alluvium layer consists primarily of unconsolidated silt, fine-to-medium grained sand, and gravel. The maximum thickness of this layer is 100 feet with a specific yield ranging from 6 percent to 12 percent. The sand and gravel zones in this layer are highly permeable and yield significant quantities of water to wells.

Laguna Formation: Older alluvium layers that make up the unconfined aquifer of the area (formerly known as the Victor Formation). These layers consist of loosely to moderately compacted sand, silt and gravel deposits with discontinuous interbedded lenses of clay. The thickness of this layer ranges between 100 feet and 650 feet and has a specific yield ranging from 6 percent to 7 percent (Olmstead and Davis, 1961). Wells tapping sand layers in the Laguna Formation yield high amounts of groundwater.

Mehrten Formation: This layer is of volcanic origin, underlies the Laguna Formation and makes up the second aquifer in the area. It consists of black volcanic sand, silt, and clay interbedded with intervals of dense tuff breccia. The sand intervals in this formation are highly permeable and wells in them can have moderate to high yields. Thickness of the layer is between 200 and 1,200 feet. Specific yields for this layer range from 6 percent to 12 percent (Olmstead and Davis, 1961).

Deeper/Non-Fresh Water Bearing Units: This includes the Valley Springs (which yields some fresh water to wells on the eastern side of the subbasin).

3.0 GROUNDWATER MONITORING

3.1 Plan Area Groundwater Level Monitoring

Current and historical groundwater levels in the Plan area are available from data collected by DWR, USBR, USGS, and Sacramento County (County). DWR provides data for about 70 wells in the Plan area

through the CASGEM Online System (<http://www.water.ca.gov/groundwater/casgem/>) including data from USBR and the County. Well and water level data collected by the USGS (usually associated with a particular study) are provided on the USGS' National Water Information System website (<http://nwis.waterdata.usgs.gov/usa/nwis/gwlevels>). Other monitoring by local municipalities or irrigation districts is not currently known.

Twenty-three wells within the Plan area have continuous data records for at least 25 years; however, only 11 of these are currently monitored. Another six wells (included in the CASGEM Plan) have records that began in the last five years. This set of 17 currently monitored wells that also have well construction information have been selected for the CASGEM program. These wells are shown in Figure 3-1 by their respective monitoring agency; additional information is included in Table 3-1 and Appendix B.

Efforts to connect well construction and lithology from Well Completion Reports to wells with existing water level data were completed for this report and input into a Data Management System (DMS). Well depths for the 17 wells range from 15 to 850 feet below ground surface; aquifer designations were made based on DWR Well Completion Reports or well depth provided by DWR. Well coverage by aquifer system is shown in Figure 3-2. Groundwater data collected by the local cooperators (including data collected as part of the CASGEM program and other SSCAWA programs) can be input into the DMS. It is expected that there will be regular updates of new data for new and existing wells/sites already in the DMS.

The groundwater monitoring has generally focused on the upper portions of the aquifer system and on the northern and western portions of the Plan area, where the majority of groundwater is pumped for domestic and agricultural uses. Wells and presumably groundwater use in the eastern portion of the Plan area has been less prevalent and consequently groundwater level monitoring of wells in this area is sparse. Figure 3-3 shows area where additional groundwater monitoring wells are suggested.

SSCAWA will be taking steps to integrate data from other entities more fully into the DMS and the CASGEM Network Plan. Other monitoring by the City of Galt is not currently known but will be requested and utilized, pending availability and relevance to CASGEM program objectives.

3.3 Current Groundwater Conditions

As mentioned above, groundwater level measurements for the 17 wells proposed for inclusion in the CASGEM program were input into the DMS. This information was used to generate water level hydrographs to show groundwater level trends over time; some of these are shown on Figures 3-4 and 3-5. These wells are generally monitored on a semi-annual basis (recently many are being monitored on a monthly basis).

In general, wells closer to the center of the Valley (38C2, 33J2, and 19N1 in Figure 3-4) show a long-term stable groundwater trend within the historical range of variation. Wells further away from the central axis of the Valley (to the east) show an overall declining trend (31P3 in Figure 3-4) of about 30 feet since 1985 (about 1 foot per year).

Through the 1960s and 1970s, water levels declined by up to twenty feet in most wells in the Plan area. In the western edge of the Plan area (38C2, 33J2, and 19N1 in Figure 3-4), water levels recovered in the mid-1980s, but declined again through the early 1990s; they rose again into the early 2000s, and have declined since then through this latest dry period. Water level records for wells in the Wilton area (near the Cosumnes River) begin in the mid-1980s; in this area, water levels did not see a full recovery in the early 2000s (Figure 3-5, wells 33Q1 and 33G1). In the southeastern area, water levels have declined steadily from the beginning of their record in the mid-1980s by about 30 feet (well 11R2, Figure 3-4).

Figure 3-5 illustrates the difference in water levels between shallow (Laguna) and deeper (Mehrten) wells. The most western pair (33J2 and 28C2) shows an upward gradient and differential season fluctuations; however, the wells are not nested monitoring wells and the perforation depths of 28C2 are unknown. Groundwater levels measured in the eastern pair (33G1 and 33Q1) track very closely to each other and show similar trends. Additional aquifer-specific groundwater level monitoring well pairs are required to better understand local groundwater conditions.

4.0 CASGEM MONITORING NETWORK AND PROGRAM

4.1 Selected Wells for CASGEM Program

The current CASGEM well network includes 17 wells that have well location, construction information (some only total well depth), and routine monitoring schedules in place by the entities that monitor them (Table 3-1). As shown on Figure 3-1, these wells are mostly located in the northern and western perimeter of the Plan area; they represent various parts of the multi-zone aquifer systems as described in Table 3-1 and shown in Figure 3-2. Well information, where available, such as required and/or suggested by DWR for the CASGEM program wells is summarized in detail in Appendix B. The addition of more wells to obtain representative monitoring coverage will be considered when additional information is available.

In the SSCAWA Plan area, most of the 17 wells are privately owned for agricultural or residential use. Generally, wells are monitored on a semi-annual basis with a higher measurement frequency in the last few years: DWR monitors eight wells, USBR monitors six wells, Sacramento County monitors two wells, and the USGS monitors 1 well (weekly measurements). There are an additional 11 wells with some historical water level records; however, either the well has no recent water level measurements or well construction is not available. Complete construction information or renewed monitoring are required for these wells to be included in the CASGEM program. Inclusion of these wells in the network will be reconsidered at a later date.

4.2 Field Methods

DWR, USBR, and USGS have established field procedures for the collection of groundwater level measurements. If local cooperators are added, an example of detailed procedures and an example form for recording water level measurements is also included here (Appendix B). SSCAWA and its cooperators will use the procedure outlined in Appendix C for the CASGEM program.

4.3 Monitoring Schedule

Historically, the wells have been measured semi-annually in the spring (generally April) and fall (generally October) of each year. Historical hydrographs show that these measurement periods generally correspond to the seasonal high and low groundwater elevations observed in their respective county subareas. Any new local cooperators will measure the CASGEM wells semi-annually during similar periods.

4.4 Groundwater Elevation Data Management and CASGEM Data Submittal

Per DWR's CASGEM program reporting requirements, the following information related to each of the designated wells monitored will be submitted online following the spring and fall measurement by July 1st and January 1st, respectively.

- CASGEM Well identification number
 - Measurement date
 - Measurement time (PST/PDT with military time/24 hour format)
 - Reference point elevation of the well (feet) using NAVD88 vertical datum
 - Elevation of land surface datum at the well (feet) using NAVD88 vertical datum
 - Depth to water below reference point (feet) (unless no measurement was taken)
 - Method of measuring water depth
 - Measurement quality codes¹
 - Measuring agency identification
 - Comments about measurement, if applicable

5.0 MONITORING PLAN RATIONALE

The current CASGEM well network is described herein; however, SSCAWA is considering additional wells that are currently being monitored for inclusion in CASGEM. The purpose of adding additional wells would be for:

- Improving horizontal and/or vertical spatial distribution of data;
- Including wells for under-represented areas of the groundwater basin;
- Identifying appropriate monitoring sites to evaluate surface water-groundwater recharge/discharge mechanisms; and

¹ Measurement quality code examples include: 1) If no measurement is taken, a specified "no measurement" code, must be recorded. 2) If the quality of a measurement is uncertain, a "questionable measurement" code can be recorded. Standard codes will be provided by DWR's online system.

- Establishing additional basic data needed to accomplish groundwater level monitoring objectives as described above.

Further examination of the suitability of existing wells for groundwater monitoring (including their location and construction and relevance to meet SSCAWA's and/or CASGEM's monitoring objectives) is necessary to determine if any existing wells would be suitable for ongoing evaluation of groundwater conditions. Additional public and private wells that are currently monitored will be considered, and approval from the property owners to participate in the CASGEM program will be solicited.

5.1 Address Data Gaps and Future Efforts

Presently, the SSCAWA CASGEM Plan has well coverage mostly around the northern and western perimeter of the Plan area. Horizontal coverage in the central area, the northeast corner and along the southeastern boundary is sparse and more wells are needed; deep well coverage is also specifically needed in the Galt area.

SSCAWA will request and incorporate available monitoring well data from the City of Galt, Galt Irrigation District, Clay Water District, and Rancho Murrieta Community Services District. Further consideration of the existing network is needed to evaluate which wells (included in CASGEM or not yet currently) are necessary to provide a representative network of water levels for the subbasin and aquifer zones within the Plan area. Future actions may include removal and/or replacement of current CASGEM wells with wells that are more representative of local groundwater conditions to better meet the objectives of the CASGEM program and also in coordination with efforts associated with the Sustainable Groundwater Management Act.

For currently monitored wells that are not included in the CASGEM program because construction information is unavailable, the well completion reports need to be identified, if available, to evaluate the screened interval and aquifer designation(s). These wells should be reconsidered for inclusion in the CASGEM dependent on whether they provide necessary representative groundwater level information for the subbasin.

6.0 REFERENCES

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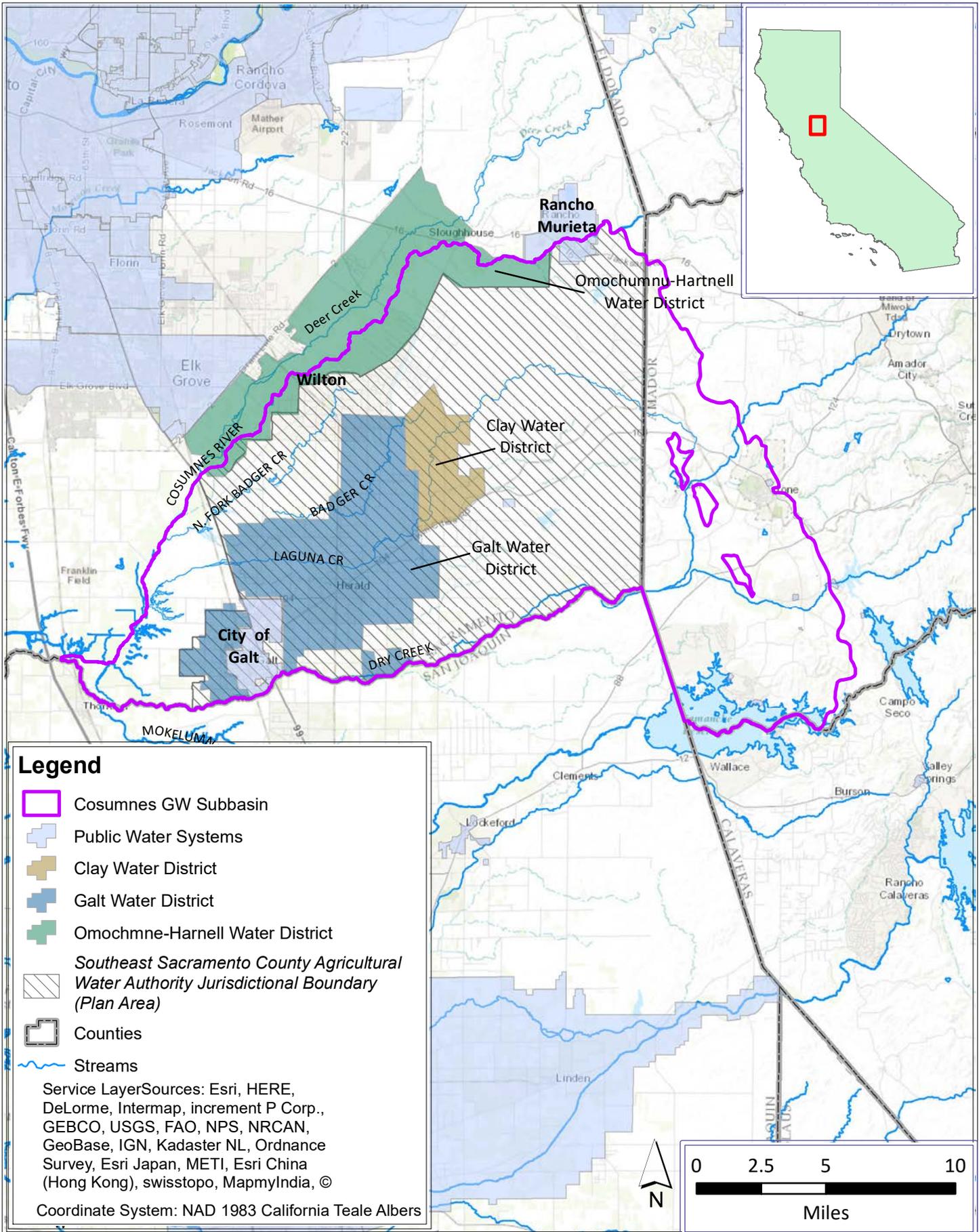
Wagner, D.L., C. W. Jennings, T. L. Bedrossian, and E. J. Bortugno. 1981. Geologic Map of the Sacramento Quadrangle. State of California. 1981.

TABLE

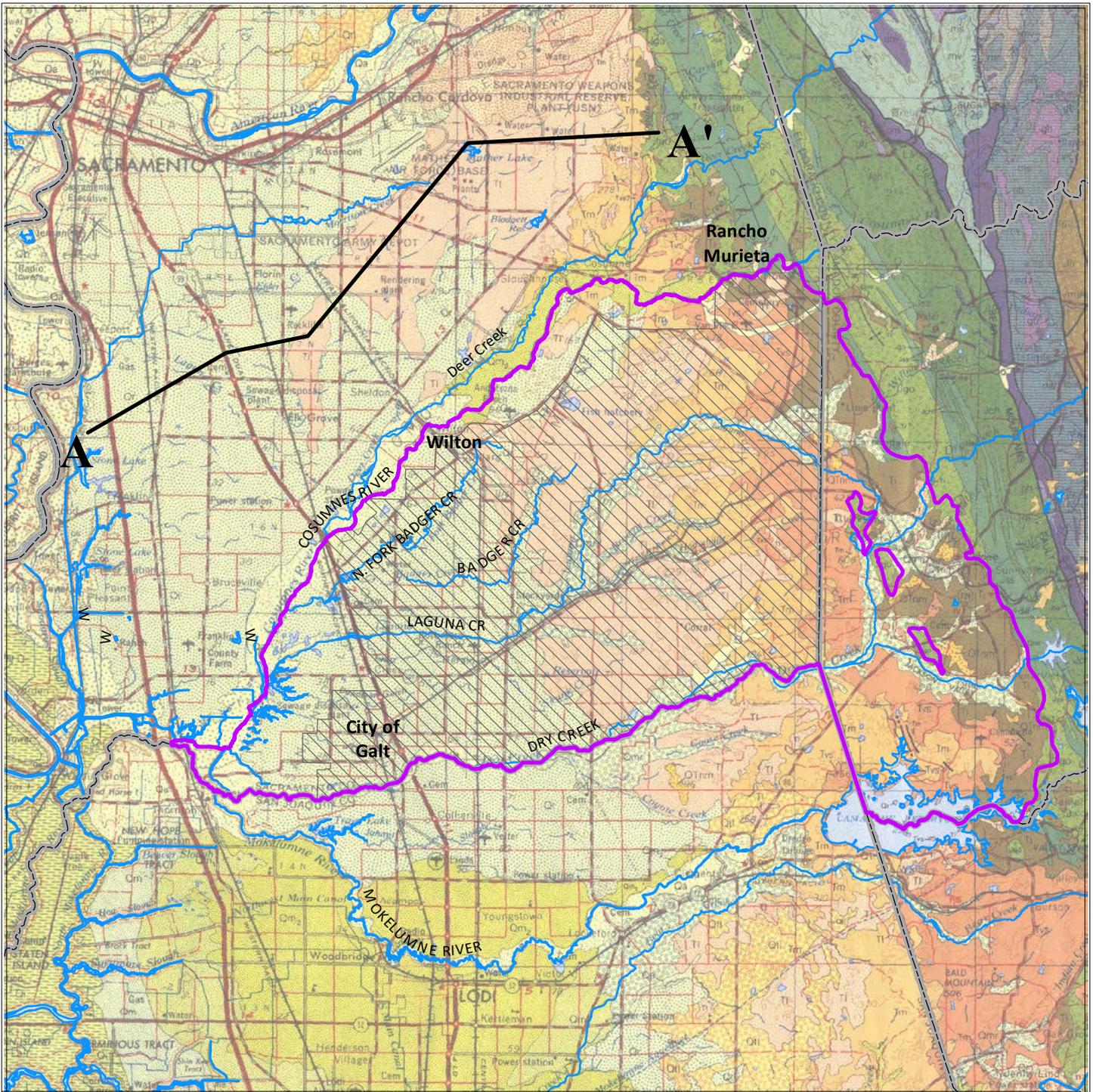
TABLE 1
WELL INFORMATION
Southeast Sacramento County Agricultural Water Authority
Groundwater Monitoring Program
CASGEM Program Wells with Measurement Frequency
2017

| GW Basin/ Subbasin | State Well Number | CASGEM ID | Owned by | Measuring Agency | Well Use | Measurement Frequency | Aquifer Designation |
|--|-------------------|--------------------|----------|---------------------|-------------|--------------------------|-------------------------|
| Sacramento Valley/ Cosumnes  | 05N06E12R001M | 382943N1212644W001 | Private | USBR | Irrigation | Semi-Annual | Laguna/Mehrten? |
| | 05N06E13R001M | 382792N1212652W001 | Private | USBR | Irrigation | Semi-Annual | Laguna |
| | 05N06E26D001M | 382623N1212973W001 | Private | DWR | Irrigation | Semi-Annual | Laguna |
| | 05N07E11R002M | 382936N1211747W001 | Private | DWR | Residential | Semi-Annual | Laguna |
| | 05N07E19N001M | 382625N1212626W001 | Private | DWR | Residential | Semi-Annual | Laguna |
| | 06N06E01G001M | 384026N1212641W001 | Private | USBR | Irrigation | Semi-Annual | Laguna? |
| | 06N06E11J003M | 383865N1212812W001 | Private | USBR | Residential | Semi-Annual | Laguna |
| | 06N06E23C001M | 383636N1212922W001 | Private | USBR | Irrigation | Semi-Annual | Laguna |
| | 06N06E28C002M | 383483N1213280W001 | Private | DWR | Irrigation | Semi-Annual | Laguna/Mehrten? |
| | 06N06E33J002M | 383264N1213191W001 | Private | DWR | Irrigation | Semi-Annual | Laguna |
| | 06N06E34P001M | 383217N1213072W001 | Private | USBR | Irrigation | Semi-Annual | Laguna/Mehrten? |
| | 06N08E15J001M | 383720N1210784W001 | Private | Sac County | Residential | Semi-Annual | Mehrten/Valley Springs? |
| | 06N08E21P003M | 383527N1211081W001 | Private | DWR | Irrigation | Semi-Annual | Laguna/Mehrten? |
| | 07N07E14R001M | 384526N1211695W001 | Private | DWR | Residential | Semi-Annual | Laguna |
| | 07N07E33G001M | 384183N1212123W001 | Private | DWR | Residential | Semi-Annual | Laguna |
| | 07N07E33Q001M | N/A | Private | USGS | Residential | Weekly | Laguna/Mehrten? |
| | 07N08E36B001M | 384205N1210459W001 | Private | Sac County | Observation | Semi-Annual | Riverbank/Younger Alluv |

FIGURES



X:\2016\16-011 So Sac Co Ag Water Authority CASGEM\GIS\CASGEM_figures\Figure 1-1 Location Map_JL20170706.mxd

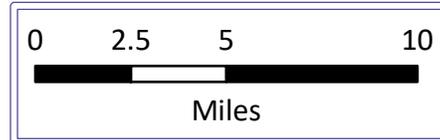


Legend

- A — A'** Cross-Section Location
- Cosumnes GW Subbasin
- Southeast Sacramento County Agricultural Water Authority Jurisdictional Boundary (Plan Area)
- Counties
- ~ Streams

Geologic Map Source:
 Geologic Map of the Sacramento Quadrangle, Ca., 1:250,000
 D.L. Wagner, C.W. Jennings, T.L. Bedrossian and E.J. Bortugno
 Published 1981

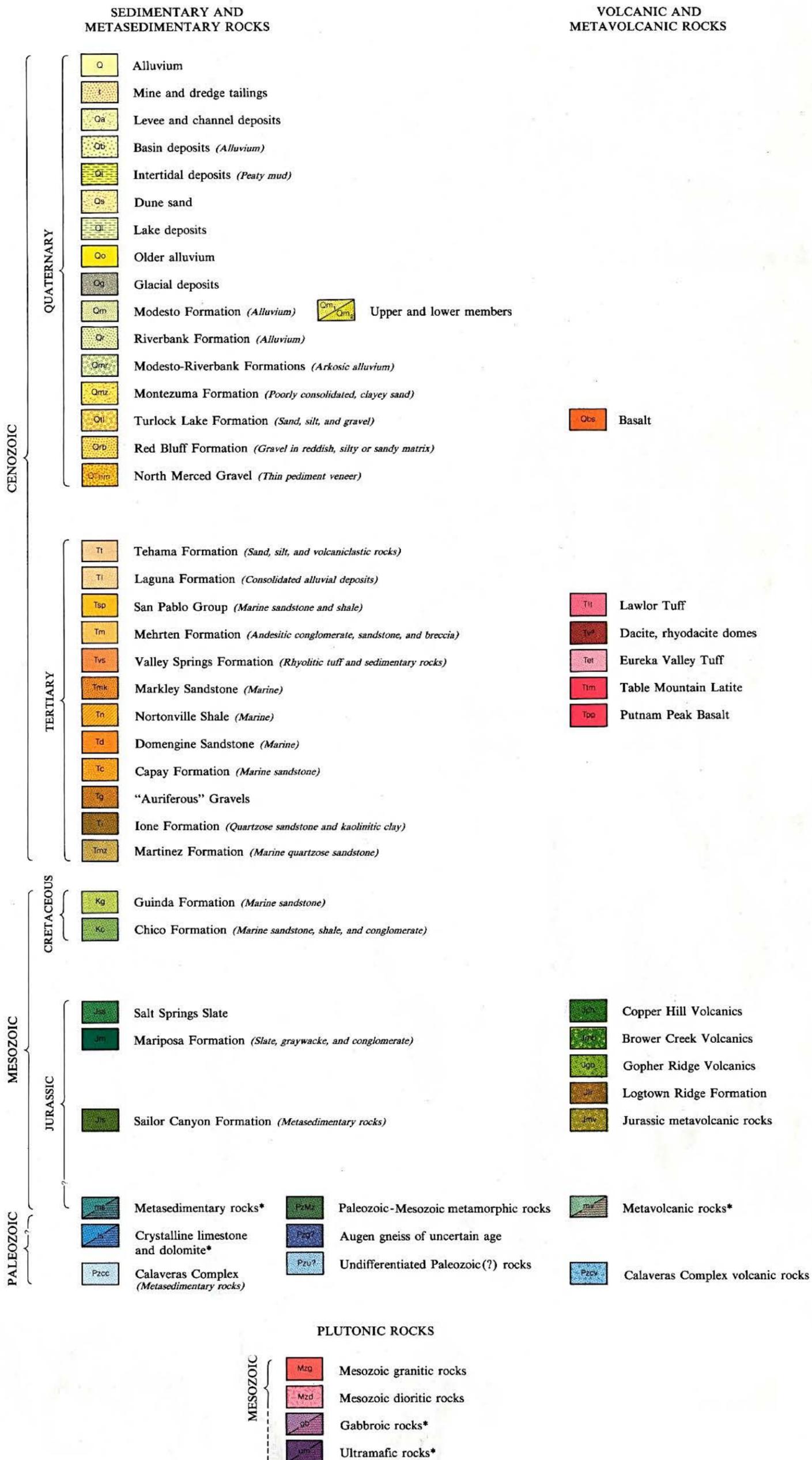
Coordinate System: NAD 1983 California Teale Albers

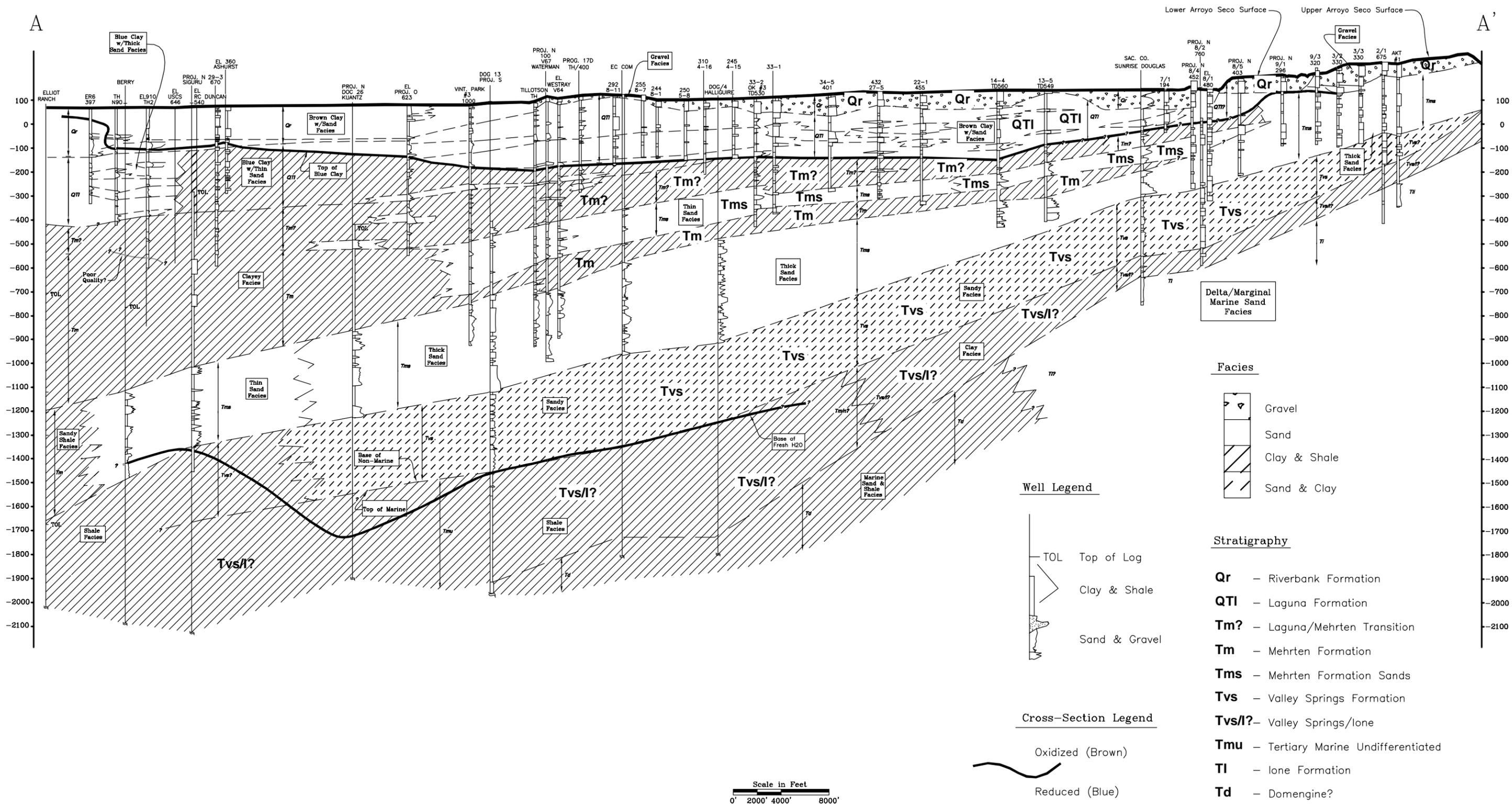


X:\2016\16-011 So Sac Co Ag Water Authority CASGEM\GIS\CASGEM_figures\Figure 2-1 Geology and Cross-Section Location_JL20170706.mxd

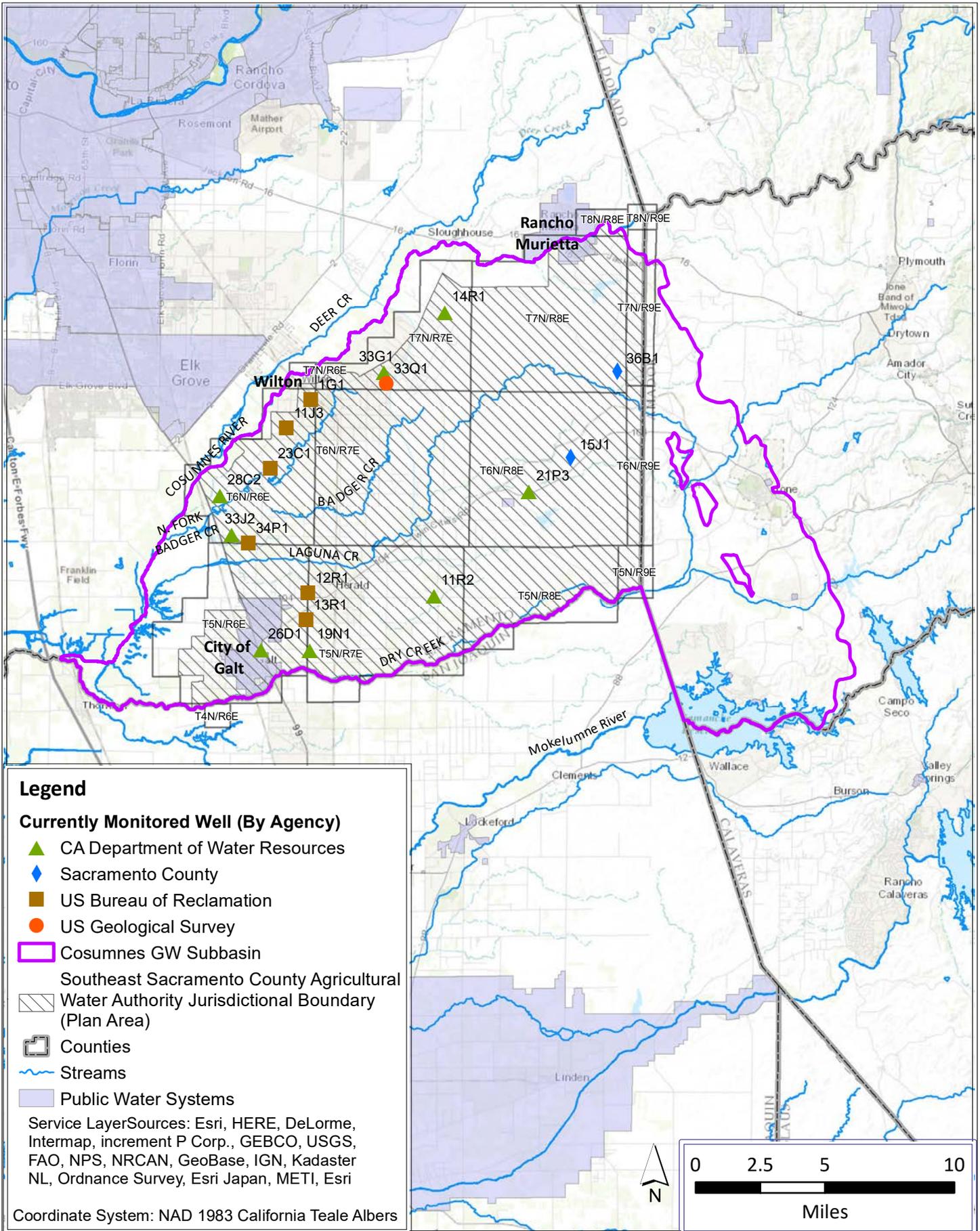
ABBREVIATED EXPLANATION

Approximate stratigraphic relationships only; see Geologic Map Explanation for more accurate stratigraphic relationships and unit descriptions.

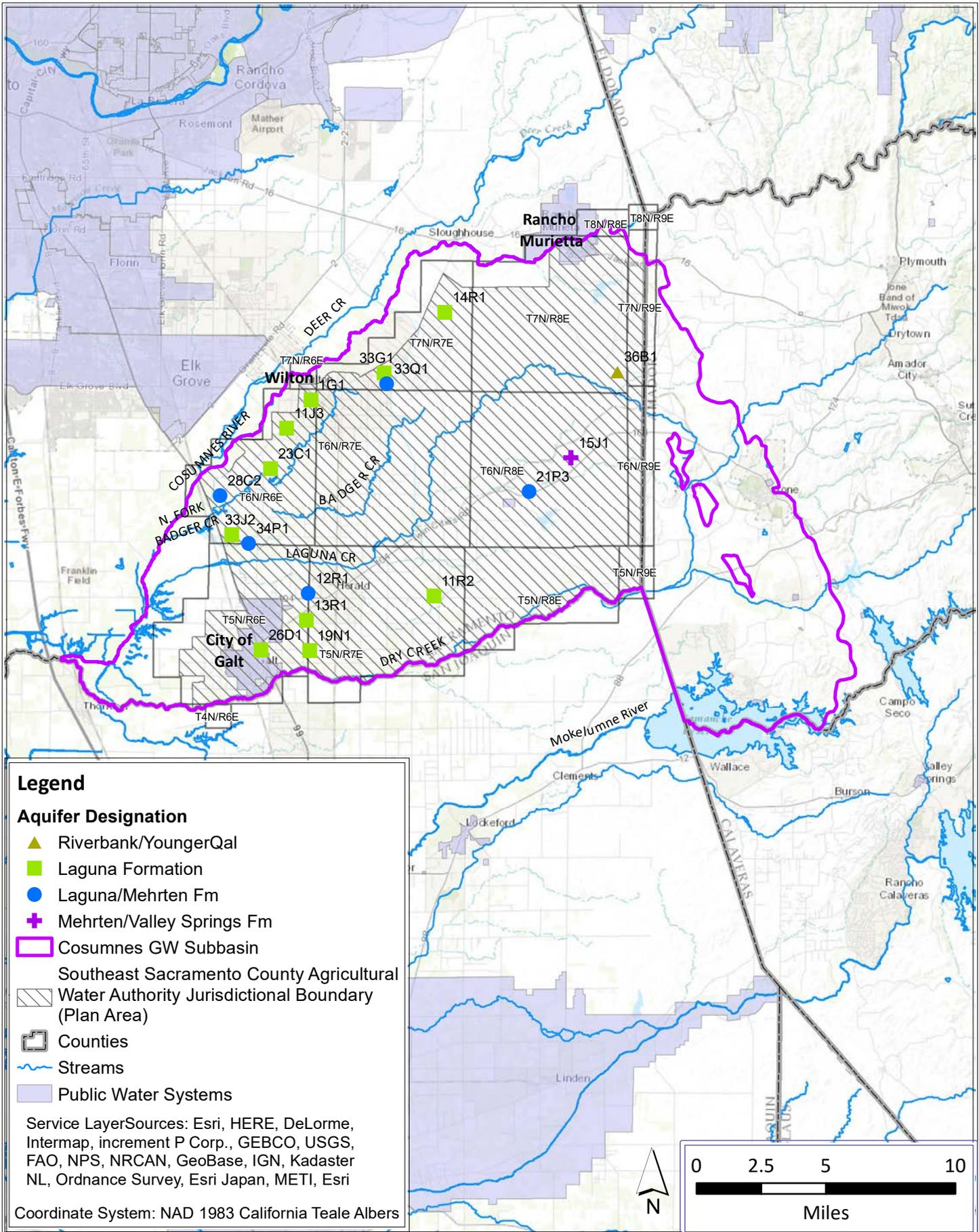




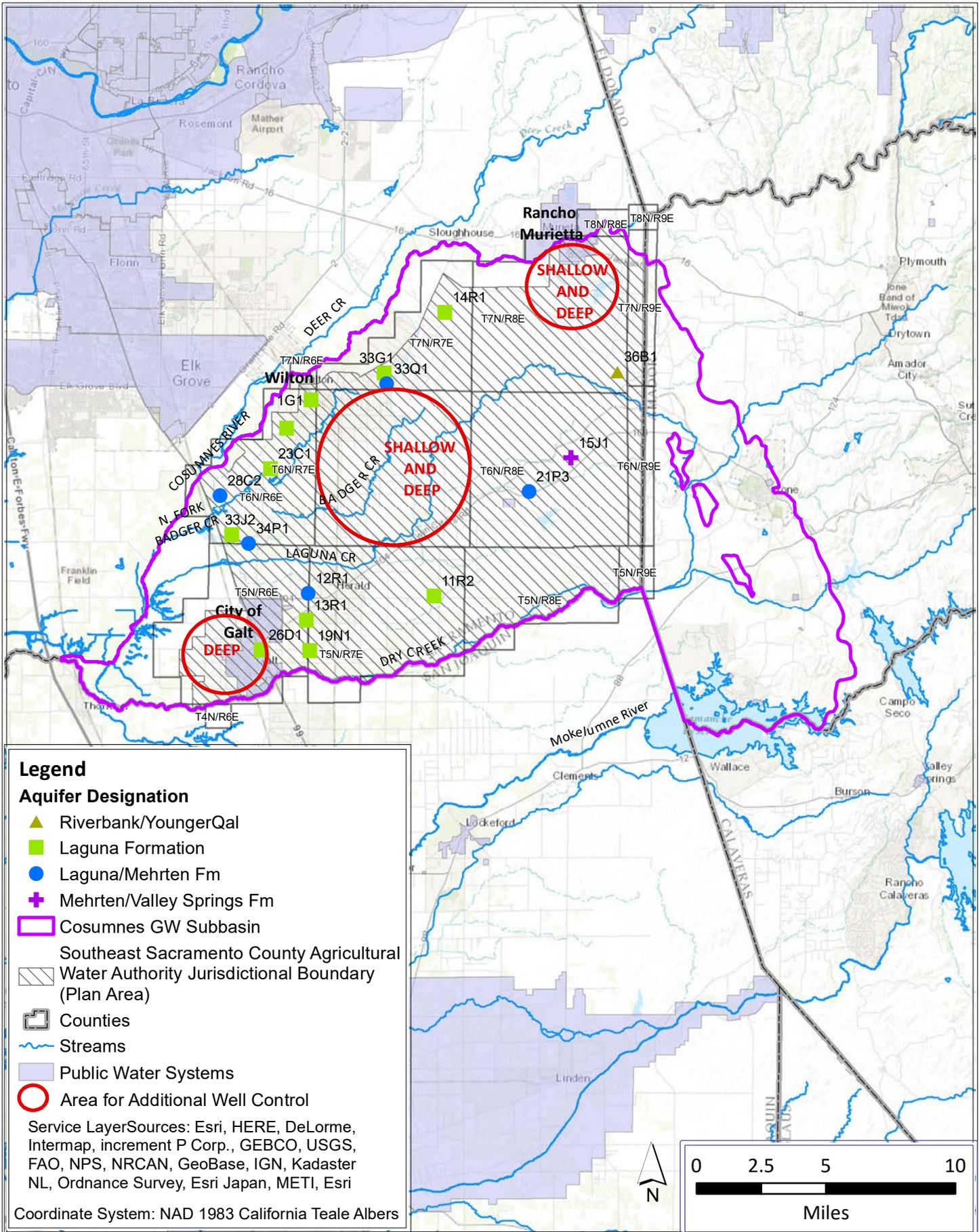
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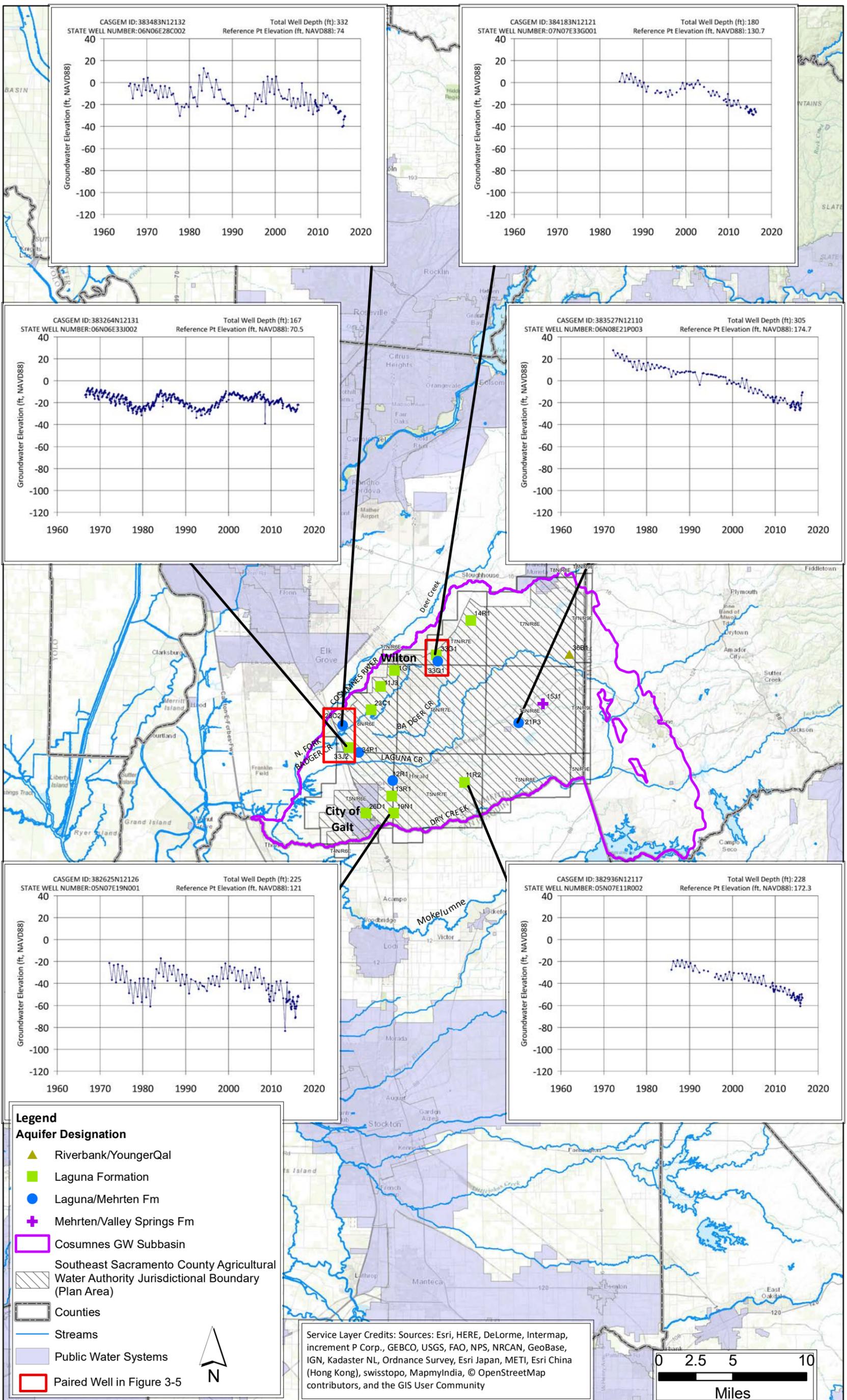
X:\2016\16-011 So Sac Co Ag Water Authority CASGEM\GIS\CASGEM_figures\Figure 3-1 Current GWL Monitoring_JL20170706.mxd



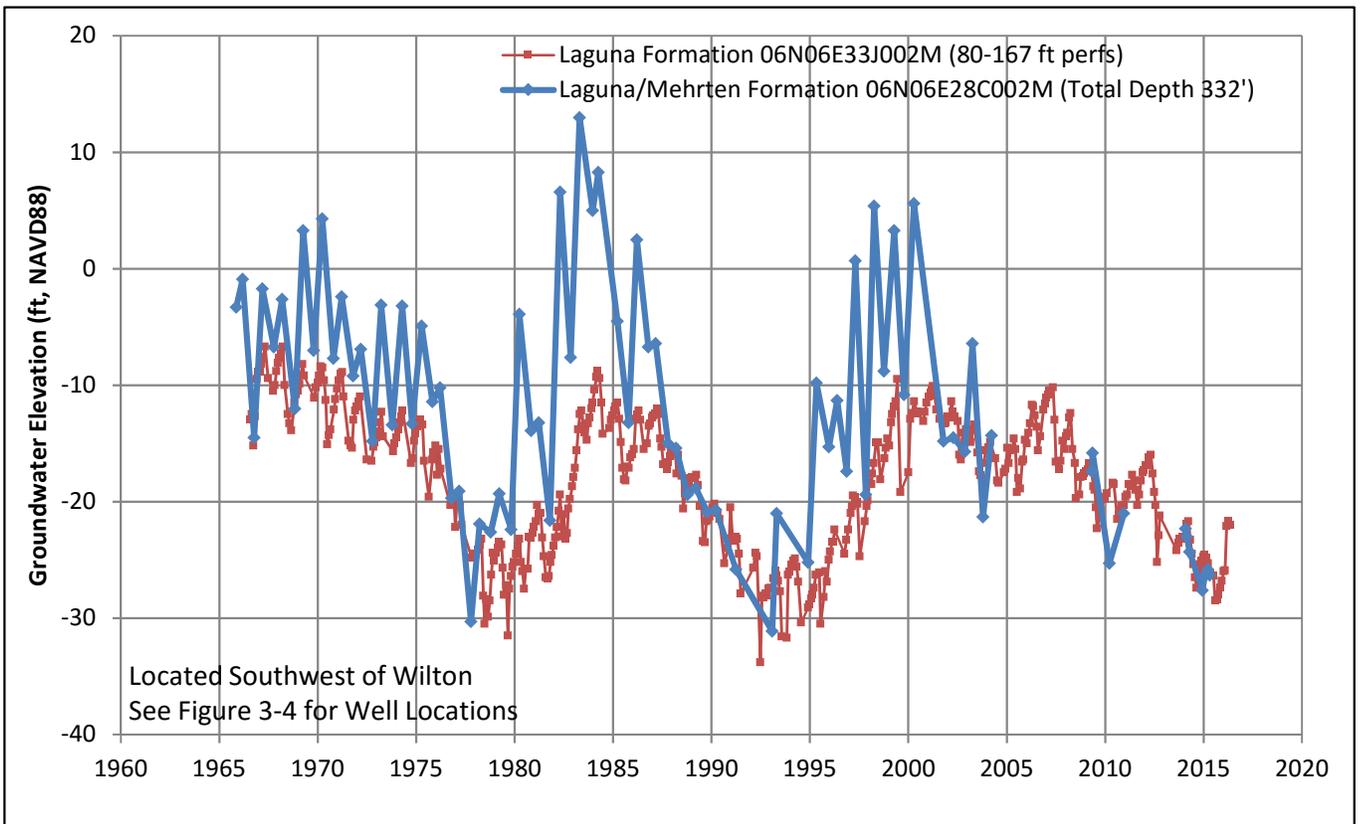
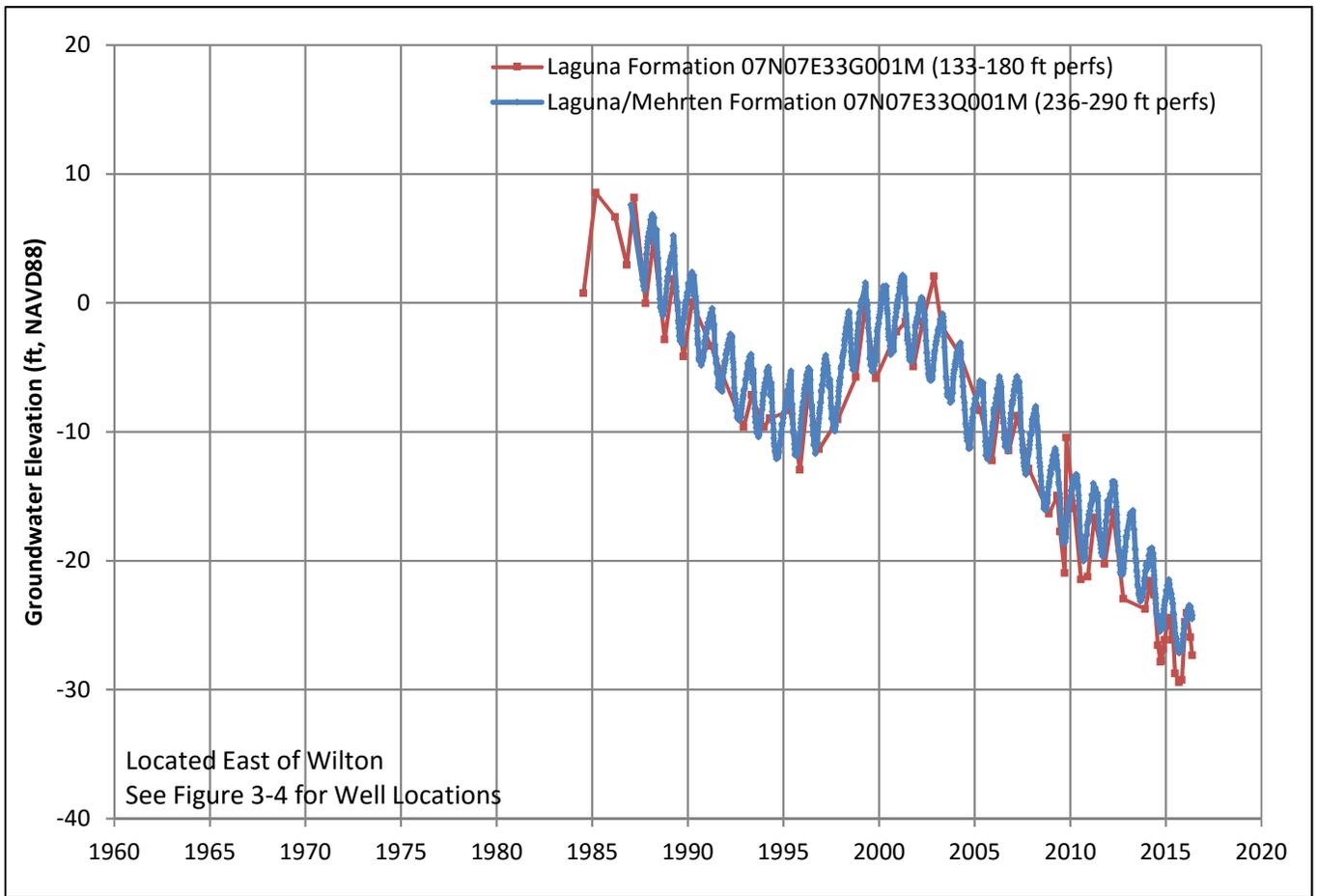
X:\2016\16-011 So Sac Co Ag Water Authority CASGEM\GIS\CASGEM_figures\Figure 3-2 Current GWL Monitoring by Aquifer_JL20170706.mxd



X:\2016\16-011 So Sac Co Ag Water Authority CASGEM\GIS\CASGEM_figures\Figure 3-3 Areas for Additional Well Control by Aquifer_JL20170706.mxd



Document Path: X:\2016\16-011 So Sac Co Ag Water Authority CASGEM\GIS\CASGEM_figures\Figure 3-4 WL Hydrograph Panel Map_JL20170706.mxd



APPENDIX A

MEMORANDUM OF UNDERSTANDING AND AGREEMENT FOR COSUMNES SUB-BASIN GROUNDWATER MONITORING ASSOCIATION AND COST-SHARING FOR DEVELOPMENT AND IMPLEMENTATION OF CASGEM PROGRAM

This Memorandum of Understanding and Agreement (“MOU”) is dated and effective this 15 day of March 2017 by and between the Southeast Sacramento Agricultural Water Authority, a joint powers authority formed under Government Code section 6500 and following (“SSCAWA”), the County of Sacramento, a political subdivision of the State of California (“County”), and the City of Galt, a political subdivision of the State of California (“Galt”). The parties to this MOU are individually referred to herein as “Party” and collectively referred to herein as “Parties.”

RECITALS

WHEREAS, Water Code section 10920 and following, and the regulations enacted thereunder, require that all groundwater basins in the state be subject to the California Statewide Groundwater Elevation and Monitoring program (“CASGEM”) on or before January 1, 2012; and

WHEREAS, Water Code section 10927 identifies the public entities that may assume responsibility for monitoring and reporting groundwater elevations (“Monitoring Entity”) under CASGEM; and

WHEREAS, in an area where no Monitoring Entity has been identified, the California Department of Water Resources (“DWR”) is required by Water Code section 10933.5 to perform the monitoring functions required by CASGEM; and

WHEREAS, in the event that DWR assumes CASGEM monitoring responsibilities for an area, certain agencies designated as eligible Monitoring Entities shall be considered ineligible for state water grant or loan funding, including counties and Groundwater Sustainability Agencies (Water Code § 10933.7); and

WHEREAS, DWR has identified those portions of the San Joaquin Valley Cosumnes Sub-basin (Basin No. 5-22.16) described in Exhibit A as areas in which groundwater elevations are not currently monitored or reported by a Monitoring Entity (“Unmonitored Area”); and

WHEREAS, the Parties each have jurisdiction in all or a portion of the Unmonitored Area; and

WHEREAS, the Parties wish to ensure that the County, SSCAWA entities, and other applicable entities be eligible for state water loan or grant funding and will not be denied eligibility as a result of the lack of a CASGEM program in the Unmonitored Area; and

WHEREAS, Lohdorff and Scalmanini, Consulting Engineers (“LSCE”) has submitted a Budget and Scope of Work for the development of a CASGEM program for the Unmonitored Area (“CASGEM Proposal”). The estimated budget for the CASGEM Proposal is \$12,000; and

WHEREAS, the California Water Code allows for the formation of voluntary cooperative groundwater monitoring associations formed for the purposes of monitoring groundwater elevations in accordance with the CASGEM program. An association may be established by contract, a joint powers agreement, a memorandum of agreement, or other form of agreement deemed acceptable by DWR; and

WHEREAS, SSCAWA has performed outreach to the stakeholder entities within the Unmonitored Area listed in Exhibit B to solicit participation in this MOU; and

WHEREAS, the Parties, as the responsive stakeholders in the Unmonitored Area, desire to enter into this MOU to form a groundwater monitoring association to implement the CASGEM Proposal and to establish cost-sharing obligations for the same.

In this context, the Parties enter into the following understanding and agreement:

1. Cosumnes Sub-basin Groundwater Monitoring Association.

a. The Parties shall form the Cosumnes Sub-basin Groundwater Monitoring Association (“Association”).

b. An Administering Agency will be appointed by the members of the Association from time to time by unanimous agreement of each Party’s designated representative and will be responsible for communication and reporting to DWR for purposes of CASGEM compliance. SSCAWA will be the initial Administering Agency.

c. The Association, led by the Administering Agency, will develop the CASGEM Proposal, including the performance of any necessary environmental review pursuant to the California Environmental Quality Act (“CEQA”). After development of the CASGEM Proposal is complete, the members of the Association will, in accordance with the provisions of this MOU and in compliance with CEQA, determine whether to approve the final CASGEM Proposal (“Final CASGEM Proposal”).

d. The Parties will meet at least once per calendar quarter in Sacramento County, California to review the status of the CASGEM Proposal. All of the Parties will be provided with written progress reports and other documentation describing the status of the CASGEM Proposal.

e. A member of the Association may disassociate upon 30 day’s notice to the other members and payment of the disassociating member’s share of costs as of the date of disassociation.

2. Review, Approval, and Implementation of CASGEM Proposal. Following completion of the CASGEM Proposal, the Parties will meet and confer to determine whether the Parties desire to participate in additional CASGEM-related activities, including implementation of the Final CASGEM Proposal. In the event the Parties elect to participate in additional activities related to the Final CASGEM Proposal, the Parties will, for a period of one hundred eighty (180) days following issuance of the Final CASGEM Proposal (“Review Period”),

negotiate in good faith with each other regarding the terms and conditions of one or more agreements to move forward with CASGEM-related activities. The negotiations will be consistent with the principle of equitable distribution of CASGEM benefits and costs. The Review Period may be extended by written agreement executed by the Parties. Following expiration of the Review Period, if one or more agreements to move forward with CASGEM-related activities have not been executed by the Parties, the Parties will have no further obligations to each other regarding the implementation of the Final CASGEM Proposal, and the Parties will be free to negotiate with any other person or entity regarding implementation of the Final CASGEM Proposal.

3. Agreement to Share Costs. The Parties agree to share the professional fees and costs of developing the CASGEM Proposal according to the following cost share, based on the scope of work and cost estimate set forth in Exhibit C attached hereto and incorporated herein:

| Party | Cost Share |
|--------|-------------|
| County | \$ 4,000.00 |
| SSCAWA | \$ 4,000.00 |
| Galt | \$ 4,000.00 |

No Party will have any obligation to pay any fees or costs arising from or relating to the CASGEM Proposal in excess of the maximum contributions specified in Exhibit C absent a written agreement executed by the Party against whom additional fees or costs are to be imposed.

4. Contracting for CASGEM Proposal. The Administrating Agency shall contract with LSCE for the CASGEM Proposal. The Administrating Agency will submit invoices to each of the Parties for work based on the cost-share percentages specified in Section 3 of this Memorandum. SSCAWA will serve as LSCE's principal point of contact for contract administration purposes.

5. No Commitment to Approve or Implement CASGEM Proposal. Notwithstanding any provision of this Memorandum, the Parties have made no determinations or commitments whatsoever to approve or implement the Final CASGEM Proposal. The Parties agree that no determinations or commitments to approve or implement the Final CASGEM Proposal can or will be made until environmental review of the Final CASGEM Proposal is completed in accordance with the California Environmental Quality Act and other applicable laws. All of the Parties retain full and absolute discretion to decline further participation following completion of the work described in Exhibit C.

6. No Additional CASGEM-Related Obligations. Except as expressly provided in this Memorandum, the Parties will have no obligations to participate financially or otherwise in CASGEM planning, feasibility analysis, design, construction or implementation.

7. Amendment. This Memorandum may be amended from time to time. No alteration, amendment, or variation of this Memorandum shall be valid unless made in writing and signed by all Parties. The County Director of the Department of Water Resources shall have delegated authority to, on behalf of the County, agree to and execute an amendment that designates a lead agency for purposes of the California Environmental Quality Act ("CEQA").

7. Attorneys' Fees. In the event of a civil action to enforce any obligation under this Memorandum of Understanding, the prevailing party shall be entitled to an award of reasonable attorneys' fees and costs (including but not limited to reasonable expert witness fees and costs) incurred in connection with such litigation.

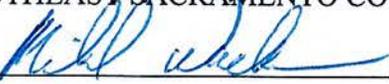
8. Entire Agreement. This instrument constitutes the entire agreement and understanding between the Parties with respect to the subject matters hereof, and supersedes and replaces any prior agreements and understandings, whether oral or written, by and between them with respect to such matters.

9. Counterparts. This Memorandum may be executed in any number of counterparts, each of which shall be deemed to be an original instrument, but all of which together shall constitute one and the same instrument.

10. Authority to Execute. Each person executing this Memorandum represents and warrants that he or she is duly authorized and has legal authority to execute and deliver this Memorandum for or on behalf of the parties to this Memorandum. Each Party represents and warrants to the other(s) that the execution and delivery of the Memorandum and the performance of such Party's obligations hereunder have been duly authorized.

IN WITNESS WHEREOF, the parties hereto have entered into this instrument as of the Effective Date set forth above.

SOUTHEAST SACRAMENTO COUNTY AGRICULTURAL WATER AUTHORITY

By: 

Title: General Manager

Date: 3/3/17

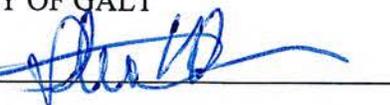
COUNTY OF SACRAMENTO

By: 

Title: DIRECTOR, DEPT. OF WATER RESOURCES

Date: 4/19/17

CITY OF GALT

By: 

Title: Public Works Director

Date: 4/13/17

Exhibit B:

Stakeholders Solicited for MOU Participation

- County of Sacramento
- City of Galt
- Sloughhouse Resource Conservation District
- Southeast Sacramento County Agricultural Water Authority
- Galt Irrigation District
- Clay Water District
- Omochumne-Hartnell Water District

Exhibit C:



March 7, 2016

Mr. Michael Wackman
P.O. Box 187
Herald, CA 95638
michaelkw@msn.com

**SUBJECT: SCOPE AND BUDGET FOR CASGEM PROGRAM FOR SSCAWA AND COUNTY
OF SACRAMENTO**

Dear Mr. Wackman:

In response to the request by the Southeast Sacramento County Agriculture Water Authority (SSCAWA) and the County of Sacramento, Luhdorff & Scalmanini, Consulting Engineers (LSCE) has prepared the following scope and budget for assistance in preparing the California Statewide Groundwater Elevation Monitoring (CASGEM) Plan. The CASGEM Plan area includes the area near the Cosumnes River to the north, the Amador County boundary to the east, and the Sacramento County boundary to the south. Specifically, the proposed CASGEM Plan area is the South Basin jurisdictional area of the South Basin Groundwater Management Plan (GMP) as shown in the attached Figure 1-2 of the GMP.

Our proposed scope consists of two (2) tasks:

- Task 1 – CASGEM Monitoring Plan Preparation
- Task 2 – Assistance with Plan Submittal/Acceptance

A more detailed description of each task is provided below.

Task 1 – CASGEM Monitoring Plan Preparation

This task involves preparation of the CASGEM Plan in accordance with the California Department of Water Resources' (DWR) *CASGEM Monitoring Plan Summary* guidance document. LSCE's scope for this item includes the following:

- a) Prepare draft CASGEM well network and rationale for well selection and coverage. This will include gathering well construction data, information on well completion by aquifer, length of historical groundwater level monitoring record, and other relevant information (as described in *CASGEM Monitoring Plan Summary* under "Well Information").
- b) Describe how the proposed network design will be used to monitor temporal groundwater elevation trends within the DWR Cosumnes Subbasin area to be monitored by SSCAWA and/or the County of Sacramento.
- c) Develop Plan sections relating to historical groundwater monitoring and groundwater conditions related to the DWR Cosumnes Subbasin area to be

monitored by SSCAWA and/or the County of Sacramento.

- d) Prepare a Plan section that describes the overall groundwater monitoring objectives and future efforts to be conducted, as resources and funding allow, to address data gaps and/or additional information needs as required under the CASGEM program.

In preparing the CASGEM Plan, LSCE will draw from groundwater-related documents recently prepared for SSCAWA/County of Sacramento, including, but not limited to the *South Basin Groundwater Management Plan* completed in October 2011.

A Draft Monitoring Plan will be submitted to SSCAWA and the County of Sacramento for review. Following SSCAWA and the County of Sacramento's review, any comments will be incorporated into a Final CASGEM Plan. A copy of the Final Plan will be distributed to SSCAWA and the County of Sacramento and an electronic copy will also be submitted to DWR via the CASGEM submittal site.

Task 2 – Assistance with Plan Submittal/Acceptance

Under Task 2, LSCE staff will assist in responding to comments by DWR as part of the Plan submittal/acceptance process. This task will also include the preparation of any additional data or GIS layers required by DWR to establish SSCAWA and/or the County of Sacramento as the CASGEM Monitoring Entity for the DWR Cosumnes Subbasin.

Budget Summary

The estimated budget to perform scope Tasks 1 and 2 is \$12,000 (Table 1). LSCE's time would be billed in accordance with the attached schedule of fees.

Table 1 – Cost Estimate Broken Down by Task

| Task | Cost |
|-------------------------------------|----------|
| Task 1 CASGEM Plan Preparation | \$10,000 |
| Task 2 Submittal/Acceptance Process | \$2,000 |
| Total | \$12,000 |

Schedule

LSCE will prepare the draft CASGEM Plan as soon as we are authorized to proceed. Recognizing that the SSCAWA Board meets on February 9, 2016, we anticipate work could begin as soon as verbal authorization is provided and/or a contract is completed, whichever occurs first. We anticipate completion of a draft CASGEM Plan by March 31. Pending the time

March 7, 2016
Mr. Michael Wackman
Page 3

needed for SSCAWA and the County of Sacramento's review (estimated to be approximately two weeks), LSCE would finalize the CASGEM Plan within one week following receipt of review comments. LSCE would submit the Final Plan to DWR via DWR's CASGEM submittal site.

We appreciate your interest in our services and wish to thank you for the opportunity to propose on the above. Please call should you have any comments, questions, or require additional information.

Sincerely,

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS



Vicki Kretsinger Grabert
President and Senior Principal Hydrologist

Attached: LSCE Fee Schedule

Figure 1-2 of the South Basin Groundwater Management Plan



LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

500 FIRST STREET WOODLAND, CALIFORNIA 95695

SCHEDULE OF FEES - ENGINEERING AND FIELD SERVICES
2016

Professional:*

| | |
|------------------------|------------------|
| Senior Principal | \$200/hr. |
| Principal Professional | \$198/hr. |
| Project Manager | \$185/hr. |
| Senior Professional | \$175/hr. |
| Project Professional | \$135 to 168/hr. |
| Staff Professional | \$115 to 130/hr. |

Technical:

| | |
|-----------------------|------------------|
| Engineering Inspector | \$115 to 130/hr. |
| ACAD Drafting/GIS | \$115/hr. |
| Engineering Assistant | \$98/hr. |
| Technician | \$98/hr. |

Clerical Support:

| | |
|---------------------------|----------|
| Word Processing, Clerical | \$69/hr. |
|---------------------------|----------|

| | |
|---|---------------|
| Vehicle Use | \$0.55/mi. |
| Subsistence | Cost Plus 15% |
| Groundwater Sampling Equipment (Includes Operator) | \$170.00/hr. |
| Copies | .20 ea. |

| | |
|-------------------------------------|-----------------------|
| Professional or Technical Testimony | 200% of Regular Rates |
| Requested Technical Overtime | 150% of Regular Rates |
| Outside Services/Rentals | Cost Plus 15% |
| Services by Associate Firms | Cost Plus 15% |

* Engineer, Geologist, Hydrogeologist, and Hydrologist

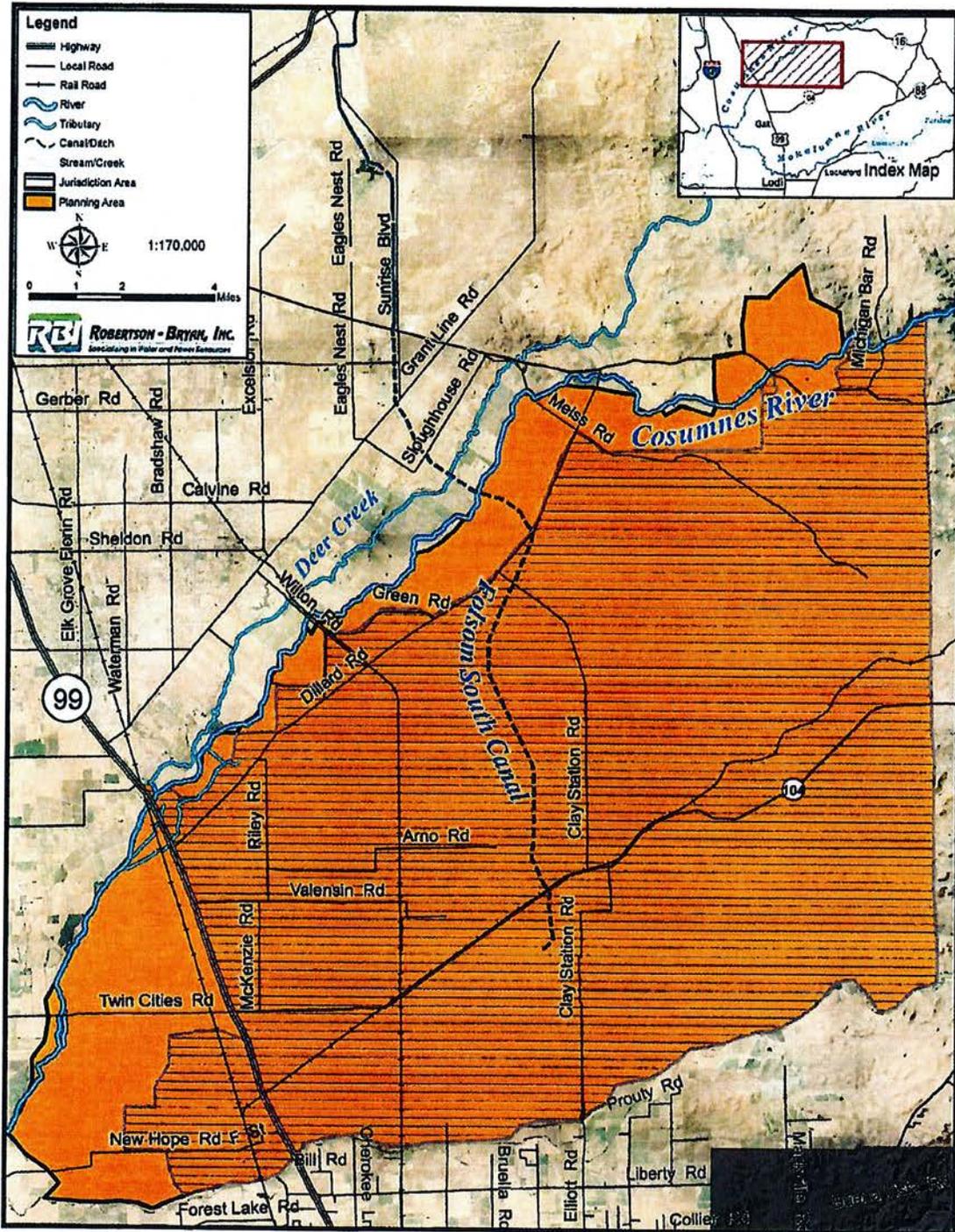


Figure 1-2. Planning and Jurisdiction areas of the South Sacramento GMP.

APPENDIX B

APPENDIX B

CASGEM Well Information

| Local Well Designation | State Well Number | Reference Point | | Ground Surface Elevation | Measurement Method | Measurement Accuracy | Well Use | Well Status | Latitude [N] | Longitude [W] | Well Completion Type | Total Well Depth | Well Completion Report # | Associated Basin | Associated Basin Portion |
|------------------------|-------------------|-----------------|-------------|--------------------------|--------------------|----------------------|-------------|-------------|--------------|---------------|----------------------|------------------|--------------------------|------------------|--------------------------|
| | | Elevation | Description | | | | | | | | | | | | |
| 05N06E12R001M | 05N06E12R001M | | | | | | Irrigation | Active | 38.2943 | 121.2644 | Single Well | 850 | | 5-22.16 | Portion of Cosumnes |
| 05N06E13R001M | 05N06E13R001M | | | | | | Irrigation | Active | 38.2792 | 121.2652 | Single Well | 240 | | 5-22.16 | Portion of Cosumnes |
| 05N06E26D001M | 05N06E26D001M | | | | | | Irrigation | Active | 38.2623 | 121.2973 | Single Well | 383 | 64518 | 5-22.16 | Portion of Cosumnes |
| 05N07E11R002M | 05N07E11R002M | | | | | | Residential | Active | 38.2936 | 121.1747 | Single Well | 228 | 47909 | 5-22.16 | Portion of Cosumnes |
| 05N07E19N001M | 05N07E19N001M | | | | | | Residential | Active | 38.2625 | 121.2626 | Single Well | 225 | 18100 | 5-22.16 | Portion of Cosumnes |
| 06N06E01G001M | 06N06E01G001M | | | | | | Irrigation | Active | 38.4026 | 121.2641 | Single Well | 330 | | 5-22.16 | Portion of Cosumnes |
| 06N06E11J003M | 06N06E11J003M | | | | | | Residential | Active | 38.3865 | 121.2812 | Single Well | 215 | | 5-22.16 | Portion of Cosumnes |
| 06N06E23C001M | 06N06E23C001M | | | | | | Irrigation | Active | 38.3636 | 121.2922 | Single Well | 275 | | 5-22.16 | Portion of Cosumnes |
| 06N06E28C002M | 06N06E28C002M | | | | | | Irrigation | Active | 38.3483 | 121.328 | Single Well | 332 | | 5-22.16 | Portion of Cosumnes |
| 06N06E33J002M | 06N06E33J002M | | | | | | Irrigation | Active | 38.3264 | 121.3191 | Single Well | 167 | 51740 | 5-22.16 | Portion of Cosumnes |
| 06N06E34P001M | 06N06E34P001M | | | | | | Irrigation | Active | 38.3217 | 121.3072 | Single Well | 375 | | 5-22.16 | Portion of Cosumnes |
| 06N08E15J001M | 06N08E15J001M | 217.34 | unknown | 216.34 | unknown | unknown | Residential | Active | 38.372 | 121.0784 | Single Well | 150 | | 5-22.16 | Portion of Cosumnes |
| 06N08E21P003M | 06N08E21P003M | | | | | | Irrigation | Active | 38.3527 | 121.1081 | Single Well | 305 | 43096 | 5-22.16 | Portion of Cosumnes |
| 07N07E14R001M | 07N07E14R001M | | | | | | Residential | Active | 38.4526 | 121.1695 | Single Well | 185 | 42896 | 5-22.16 | Portion of Cosumnes |
| 07N07E33G001M | 07N07E33G001M | | | | | | Residential | Active | 38.4183 | 121.2123 | Single Well | 180 | 9487 | 5-22.16 | Portion of Cosumnes |
| 07N07E33Q001M | 07N07E33Q001M | | | 134 | | | Residential | Active | 38.41213308 | 121.2102249 | Single Well | 300 | 358559 | 5-22.16 | Portion of Cosumnes |
| 07N08E36B001M | 07N08E36B001M | | | 189.35 | | | Observation | Inactive | 38.4205 | 121.0459 | Single Well | 15 | | 5-22.16 | Portion of Cosumnes |

APPENDIX C

Appendix C
PROCEDURE FOR MEASURING
THE DEPTH TO WATER IN MONITORING AND PRODUCTION WELLS

Purpose

To obtain an accurate dated and timed measurement of the static depth to water in a well that can be converted into a water level elevation in reference to a commonly used reference datum (e.g., NAVD 1988). In this context, static means that the water level in the well is not influenced by pumping of the well. For comparability, measurements should be obtained according to an established schedule designed to capture times of both highest and lowest seasonal water level elevations. Also for comparability, measurements during a particular field campaign should be obtained consecutively and without delay within the shortest reasonable time.

Measurement Procedure

- If a well is being pumped, do not measure; return later, but not sooner than 60 minutes and preferably after 24 hours.
- Turn on water level indicator signaling device and check battery by hitting the test button.
- Remove access plug or well cap from the well cover and lower probe (electric sounder) into the well.
- When probe hits water a loud “beep” will sound and signal light will turn red.
- Retract slightly until the tone stops.
- Slowly lower the probe until the tone sounds.
- Note depth measurement at rim (i.e., the surveyed reference point for water level readings) of well to the nearest 0.01 foot and rewind probe completely out of well.
- Remove excess water and lower probe once again into well and measure again.
- If difference is within ± 0.02 foot of first measurement, record measurement.
- If difference is greater repeat the same procedure until three consecutive measurements are recorded within ± 0.02 foot. If not able to obtain three consecutive measurements, either record a ‘No Measurement’ with a notation that well is pumping, or record the measurement with ‘Questionable Measurement’ notation to indicate either pumping or recently pumping.

- Rewind and remove probe from well and replace the access plug or well cap in the well cover.
- Clean and dry the measuring device/probe and continue to next well.

Special Circumstance – Oil Encountered in Well

If oil is detected in the well structure, the depth to the air-oil interface is measured. To obtain such a measurement, the electric sounder is used similar to the way chalked steel tapes were traditionally used for depth-to-water measurements.

1. Lower the cleaned probe well below the air-oil interface (e.g., 1 foot). Read and record the depth at the reference point (since this depth is chosen somewhat arbitrarily by the field technician, an even number can be chosen, e.g., 37.00 feet). This measurement is the length of cable lowered into the well and corresponds to a line that the oil leaves on the probe or cable (i.e., the oil inundation line). Above this line, smudges of oil may appear on the cable. Below this line, the cable/probe is completely covered with oil. If the probe is lowered too far, completely penetrates the oil, and is far submerged in the water below the oil, parts of the probe/cable below the oil inundation line may also appear smudgy.
2. Retrieve probe, identify and record the oil inundation line on the cable (e.g., 2.72 feet). This measurement does not reflect the thickness of the oil. It reflects the length of the cable below the air-oil interface.
3. Compute the depth to oil by subtracting the length of line below the air-oil interface from the corresponding measurement at the reference point: $\text{Depth to oil} = 37.00 \text{ feet} - 2.72 \text{ feet} = 34.28 \text{ feet}$.

Since oil has a slightly smaller density than water, a depth-to-oil measurement will always be smaller than a corresponding depth-to-water measurement in the same well if oil were not present. Depth-to-oil measurements yield a reasonable approximation to depth-to-water measurements unless the oil thickness is great. For each foot of oil in the well casing, the depth-to-oil measurement will be approximately 0.12 foot smaller than a corresponding depth-to-water measurement if oil were not present.

Recordation

1. Name of field technician
2. Unique identification of well
3. Weather and site conditions (e.g., clear, sunny, strong north wind, intense dust blowing over wellhead from nearby plowed field; dry ground, easy access)
4. Condition of well structure (e.g., well cap cracked – replaced with new one; wasp hive between well casing and well housing; no action, discuss with project manager)
5. Time and date of depth-to-water reading

Any other pertinent comments (e.g., sounder hangs up at 33 feet, thus no measurement; or: fifth measurement of ~55.68 feet in a row...residual water in end cap?; or: oil in well...measurement is depth to oil; or: intense sulphur odor upon opening well cap; or: nearby (west ~100 feet) irrigation well pumping)