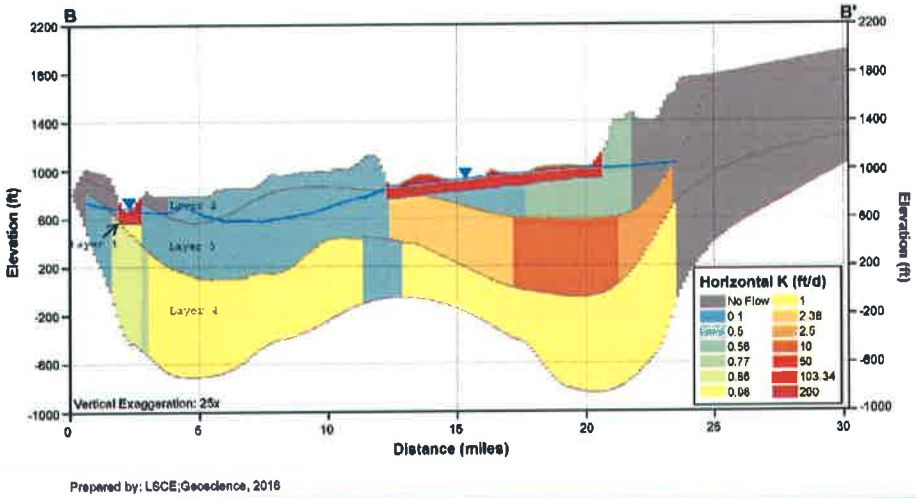
PROPOSAL TO PROVIDE PROFESSIONAL ENGINEERING/HYDROGEOLOGY CONSULTING SERVICES FOR THE

DEVELOPMENT OF A GROUNDWATER SUSTAINABILITY PLAN FOR PASO ROBLES SUBBASIN

December 4, 2017



Submitted by

LUHDORFF & SCALMANINI CONSULTING ENGINEERS

in association with

CHG CLEATH-HARRIS GEOLOGISTS

cbi Consensus Building Institute

Stillwater Sciences

GEOSCIENCE Groundwater Consultants

ERA Economics

Contact: William Halligan
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Cover Letter

December 4, 2017

Mr. Dick McKinley, Public Works Director
Public Works Department, City Hall
1000 Spring Street
Paso Robles, California 93446

Subject: **Proposal to Provide Professional Engineering/Hydrogeology Consulting Services for the Paso Robles Subbasin for Development of a Groundwater Sustainability Plan (GSP)**

Dear Mr. McKinley:

Luhdorff & Scalmanini Consulting Engineers (LSCE) along with Geoscience Support Services, Inc. (Geoscience), Cleath-Harris Geologists (CHG), Stillwater Sciences, ERA Economics (ERA), and Consensus Building Institute (CBI) (LSCE Project Team) are pleased to submit this proposal in response to the October 31, 2017 Request for Proposals (RFP) Invitation to Submit Proposal For Paso Robles Subbasin Groundwater Sustainability Plan Development. This Project Team has the background and local experience that the five Groundwater Sustainability Agencies (GSAs) in the San Luis Obispo County portion of the Paso Robles Subbasin (Subbasin) are seeking to develop a Groundwater Sustainability Plan (GSP) that is cost effective and will meet (not surpass) the Department of Water Resources' (DWR) expectations for a GSP for a DWR-designated critically overdrafted basin. The LSCE Project Team understands and appreciates the GSAs' preference for a GSP that complies with all the GSP regulations, but it does not need to be an "A+ effort".

The LSCE Project Team brings the technical and Sustainable Groundwater Management Act (SGMA) experience that will result in a successful, cost effective GSP effort.

1. **Knowledge and experience working with the DWR staff who will be reviewing and approving GSPs.** LSCE was involved in the initial development of the GSP regulations and the subsequent implementation of the regulations, including development of an Alternative to a GSP and, on behalf of a City, critical review of an Alternative. These experiences provided LSCE with an understanding of which areas of the GSP development process generate the most scrutiny and attention by DWR. This knowledge and experience will benefit the Paso Robles GSAs in producing a DWR-approved GSP.
2. **Recent and long-term experience by CHG, Geoscience, LSCE and Stillwater working in the Subbasin for many of the GSAs and local stakeholders.** This experience and familiarity with the Subbasin will reduce the level of effort and time necessary to develop a GSP and will enhance the ability of the GSAs to build consensus. In addition, LSCE, Geoscience, and CBI have long-term experience working with stakeholder groups in Monterey County and the Salinas Valley which will be beneficial during GSP coordination efforts.
3. **Capacity to complete a GSP on schedule.** The LSCE Project Team's knowledge, comprehensive understanding of groundwater conditions, and development of the existing numerical groundwater flow model (Geoscience developed the current version for the Subbasin), provide the foundation for streamlining GSP development efforts and minimizing time and expense.
4. **Technical and economic expertise to critically evaluate management actions and projects applicable to the Paso Robles Subbasin current and projected groundwater**

conditions. The Supplemental Supply Options Feasibility Study provides a list of projects that likely will be considered in the development of the GSP. We believe other less costly and feasible approaches should be considered and evaluated as part of the GSP effort. LSCE encountered a similar, costly, and technically challenging approach that was initially considered for the Salinas Valley Water Project. An alternative plan was proposed by LSCE that was technically achievable and less costly, which was then implemented as the Salinas Valley Water Project that is currently in operation. LSCE believes the Paso Robles Subbasin GSAs would benefit from a different perspective on achieving sustainability in the Subbasin than what has been previously developed that could save time, be technically feasible and achievable, and less costly.

This proposal includes a scope and budget for developing a GSP that meets SGMA requirements and the GSP regulations.

We hereby certify that the information presented in this proposal is true and correct to the best of our knowledge. This proposal is valid for ninety (90) days.

William L Halligan

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1. Qualifications

Luhdorff and Scalmanini, Consulting Engineers (LSCE) along with Geoscience Support Services (Geoscience), Cleath-Harris Geologists (CHG), and Stillwater Sciences (Stillwater) have complementary technical skills and qualifications covering a wide range of water resource services. All four firms are highly familiar with the provisions of SGMA, and are extensively involved in SGMA-related work in groundwater basins in California. The LSCE Project Team is augmented by Consensus Building Institute (CBI) and ERA Economics (ERA) to provide facilitation services (CBI) and economic analyses of management actions and projects. Each firm in the Project Team has a long history of working in both the Paso Robles Subbasin and throughout California in basins with similar groundwater conditions. The LSCE Project Team is involved in SGMA and GSP related projects in over 15 basins in California, many of these high priority and designated as critically overdrafted. An overview of the number of full-time employees, main office location, professional registrations, and number of years in operation for LSCE, Geoscience, CHG, and Stillwater are presented in **Table 1**.

Company Name	Luhdorff & Scalmanini Consulting Engineers	Geoscience Support Services	Cleath-Harris Geologists	Stillwater Sciences
Full Time Employees	42	30	7	65
Main Office Location	Woodland, CA	Claremont, CA	San Luis Obispo, CA	Berkeley, CA
Professional Registrations	• 11 Professional Geologists • 3 Certified Hydrogeologists • 2 Certified Engineering Geologists • 2 Professional Engineers • 1 Professional Groundwater Hydrologist • 1 Engineer-in-Training, 1 Geologist-In-Training	• 9 Professional Geologists • 6 Certified Hydrogeologists • 1 Certified Engineering Geologist • 1 Professional Engineers • 2 Engineers-in-Training • 4 Geologist-in-Training	• 2 Professional Geologists • 2 Certified Hydrogeologists • 1 Certified Engineering Geologists • 1 Geologist-In-Training	• 4 Professional Geologists • 2 Professional Engineers • 1 Professional Hydrologist
Years as Company	37 (1980)	39 (1978)	33 (1984)	21 (1996)

LUHDORFF AND SCALMANINI, CONSULTING ENGINEERS

LSCE is a privately owned, California S-Corporation, consulting engineering firm. LSCE is financially stable, and has been in continuous operation since 1980. Throughout the almost 40 years that LSCE has been in business, our focus has been on the investigation, development, use, protection, and management of groundwater resources. LSCE provides a full complement of groundwater resources services, including conjunctive use planning, artificial recharge, analyses of groundwater - surface water (GW-SW) interaction, land subsidence analyses, groundwater modeling, conceptual model development, sustainable yield and water budget development in basin-scale settings. LSCE routinely conducts analyses for water budget development and hydrogeologic characterizations, similar to those required for GSP development. LSCE has the resources necessary to complete a GSP that complies with the Department of Water Resources (DWR) GSP regulations. LSCE key staff who are leading the LSCE Project Team have worked in the Paso Robles Subbasin since the early 2000s for San Luis Obispo County along with agricultural interests. This work included the development of the Phase I Paso Robles Groundwater Basin Study with CHG and the 2005 update of that report that included the development of the first groundwater flow model of the Subbasin.

LSCE staff are professionals experienced in all aspects of groundwater ranging from hydrogeologic interpretation, hydrologic modeling, GIS, and database design, to well and pump station design and construction. LSCE combines a broad understanding of groundwater resources with specific knowledge of methods and applications of groundwater modeling. Additionally, LSCE's experience in regional characterization of groundwater conditions and understanding of the many geologic, hydrologic, legal, and institutional factors affecting groundwater provide a necessary perspective for the development of GSPs. The LSCE Project Team is currently involved in over 15 GSP efforts. See www.lsce.com for more information.

LSCE TEAM PARTNERS

Complementing the experience of LSCE, the LSCE Project Team is composed of highly qualified firms that have been chosen for specific roles in the preparation of the GSP.

GEOSCIENCE SUPPORT SERVICES

GEOSCIENCE has a comprehensive understanding of the basin as our team helped complete an extensive groundwater basin study to better understand the basin's hydrogeology, and to implement long range water resource planning tools to prevent critical overdraft. As part of a larger team, GEOSCIENCE developed an up-to-date numerical groundwater flow model to evaluate potential projects and programs for future basin management. Our team developed a model, a new water balance analysis, evaluated rainfall recharge, subsurface inflow, stream-groundwater interactions, agricultural irrigation rates, rural water use, and groundwater storage change. We also calibrated the Basin Watershed Model, extending the analysis from the Basin to the surrounding watershed. Our knowledge of the project and existing model will help maximize the use of existing data and help improve project efficiencies potentially reducing costs and schedule.

CLEATH-HARRIS GEOLOGISTS

CHG has been serving the northern portion of San Luis Obispo County for 33 years performing hydrogeologic services on properties, and for stakeholders, throughout the Paso Robles Groundwater Subbasin. CHG (formerly Cleath & Associates) accomplishments have included being a major author of the Phase I Paso Robles Groundwater Basin Study and contributions to the update of that report. As part of the study, CHG developed the geologic/hydrogeologic characterization of the Subbasin (geologic and hydrogeologic cross sections, base of the permeable

sediments map), defined basin management areas, evaluated surface water resources, and performed the water quality characterization. CHG was co-author of the Groundwater Banking Feasibility Study of the Paso Robles Groundwater Basin. This study identified potential groundwater recharge areas within the basin. Groundwater recharge modeling has been performed for local reaches of the Salinas River. Most recently, CHG modeled groundwater mounding from Nacimiento River discharges in the proximity of the City's Thunderbird well field. CHG performed an assessment of County groundwater monitoring locations in the Paso Robles Groundwater Subbasin and identified areas and aquifers that would benefit from additional groundwater monitoring for improved basin management

On GSP-related projects, CHG provided the technical lead and was the primary contributor on hydrogeology for the Los Osos Basin Plan, a GSP-equivalent sustainability plan in California that resolved disputes among major groundwater users. The plan was used for basin adjudication and includes a physical solution for managing the basin, with measurable objectives, a comprehensive monitoring program, and water use efficiency and infrastructure programs designed to achieve sustainable management. CHG brings expert-level knowledge of the Paso Robles Subbasin, along with high-level sustainability plan experience.

STILLWATER SCIENCES

Stillwater Sciences is a 65-person scientific consulting firm with specialists in geology, hydrology, engineering, aquatic and terrestrial biology, wetland and restoration ecology, water quality, and spatial analysis with an office in Morro Bay, San Luis Obispo County. Stillwater specializes in science-based technical approaches to water resource management and has been conducting hydrologic, geomorphic, riparian, and ecological studies for over 20 years. Stillwater is leveraging this experience to understand the impacts of groundwater management on groundwater-dependent ecosystems (GDEs) throughout California. Stillwater's physical and biological scientists routinely conduct investigations and projects related to erosion risk assessment, regional planning, engineering design, landscape evaluation, restoration and mitigation opportunities, endangered species assessment, and clean water directives in support of basin-scale water resource management for water agencies and utilities. Stillwater scientists played a key role in developing restoration objectives and strategies to support resilient hydrologic and ecological functions in the San Joaquin River downstream of Friant Dam as a precursor to the San Joaquin River Restoration Program (including analyses of instream habitat, riparian habitat establishment, and groundwater resources) and in developing a monitoring and mitigation crediting system after Program implementation. Stillwater is currently assisting in the development of GSPs for Chowchilla and Madera Subbasins in Madera County and providing technical support to analyze GW-SW interactions and ecological linkages.

ERA ECONOMICS

ERA Economics, LLC (www.eraeconomics.com) is based in Davis with a team of six professionals in the field of agricultural and resource economics. ERA specializes in modeling agricultural economic systems, and evaluating the effects of resource and economic policies on those systems. ERA provides insightful feasibility and benefit-cost analyses, resource valuation and commodity forecasting, providing clients with data-driven economic analysis of complex business and policy questions at the intersection of agriculture and water resources.

CONSENSUS BUILDING INSTITUTE

The Consensus Building Institute (CBI), founded in 1993, improves the way that leaders collaborate to make organizational decisions, achieve agreements, and manage multi-party conflicts and planning efforts. Under SGMA, stakeholders have a significant role in participation and decision-making. CBI will help facilitate stakeholder involvement using our Mutual Gains Approach. CBI excels in

situations where tough policy questions combine with lively politics, complex technical and scientific concerns, and sometimes, contradictory legal and regulatory frameworks. CBI facilitators apply substantive expertise, deep technical understanding, and strong process skills to skillfully manage complex public and private multi-stakeholder engagements at the local, state, regional, national, and international level.

Together the LSCE Project Team possesses broad technical skills and qualifications to provide the services needed to complete the tasks described in the RFP. We are thoroughly familiar with SGMA, the GSP regulations, and the many components and requirements of the legislation and regulations. We are extensively involved in SGMA-related work throughout California, particularly in basins with a mix of urban and irrigated agriculture and signs of sustainability challenges. The LSCE Project team is ready to assist the Paso Robles Subbasin GSAs in completing a practical and cost-effective GSP on schedule.

STAFF QUALIFICATIONS

LSCE STAFF QUALIFICATIONS

Mr. Will Halligan and Mr. Pete Leffler are the key staff from LSCE that will develop the GSP and provide overall project management and client interaction. Ms. Vicki Kretsinger Grabert will provide senior technical review and oversight. The qualifications of Ms. Vicki Kretsinger Grabert, Mr. Halligan and Mr. Leffler are provided below.

Will Halligan, PG, Principal Hydrogeologist and Principal-In-Charge

Mr. Halligan is a licensed Professional Geologist and has over twenty-five years of professional groundwater consulting experience in California, including over 20 years with LSCE. On behalf of clients, including many local agencies, Mr. Halligan helps lead LSCE's efforts to comply with the SGMA legislation and GSP regulations in several basins in California. Mr. Halligan is also involved in groundwater management and development projects including groundwater resource and conjunctive use programs. His experience includes development and peer review of regional, basin-scale to local groundwater flow and solute transport models, evaluation and assessment of geologic and hydrologic conditions for groundwater resource management and monitoring programs on local to regional scales; impacts analysis for CEQA and NEPA studies, investigation and identification of overdraft conditions; and development of groundwater management programs for sustainable groundwater development.

Mr. Halligan is currently leading LSCE efforts in GSP development in critically overdrafted subbasins in the San Joaquin Valley which have similar sustainability challenges as the Paso Robles Subbasin. These challenges include not only understanding the geologic and hydrogeologic technical aspects of a GSP but also coordination and working with multiple GSAs and stakeholder groups to gain consensus on GSP development and management of groundwater resources. Mr. Halligan has been working in the Paso Robles Subbasin for the past four years for agricultural interests that are a key member of the Shandon-San Juan Water District. These efforts have involved evaluation of geologic and hydrogeologic conditions in the Subbasin, providing peer review comments on the existing groundwater flow model of the Subbasin and the Draft Supplemental Supply Options Feasibility Study (December 2016).

References:

Mendota Pool Group Transfer Pumping Program and Related Studies, Delta-Mendota Subbasin (1999 to Present)

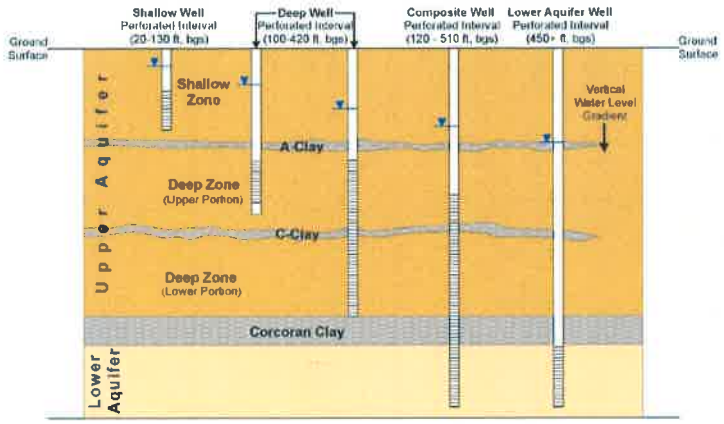
Mr. Jim Stilwell, President Mendota Pool Group

559-674-8897, jds@logoluso.com

LSCE has been working on a transfer pumping program and related activities for the Mendota Pool Group (MPG) and the US Bureau of Reclamation since 1999 and Mr. Halligan has led this effort since 2012. The transfer program involves discharging groundwater into the Mendota Pool in exchange for surface water deliveries to MPG-owned land in the Westside Subbasin. LSCE's work addressed key concerns of the potential impacts of MPG groundwater pumping for transfer purposes on the groundwater resources and neighboring water districts. Key aspects include:

LSCE's work addressed key concerns of the potential impacts of MPG groundwater pumping for transfer purposes on the groundwater resources and neighboring water districts…

- Collecting, analyzing, interpreting, and reporting data on pumping, groundwater level, sediment sampling, groundwater and surface water quality, and subsidence.
- Annual reporting on the impacts of the transfer program
- Technical analyses for a 20-year Program extension.
- Development and calibration of a numerical flow and solute transport model
- Analysis of effects of pumping regimes and recharge programs on different aquifer zones.



- Presentation of model results and interpretations through reports and GIS products.
- Design of comprehensive monitoring program for collection, aggregation, and analysis of well pumping, water conveyance, groundwater levels, water quality, and land subsidence.
- Development of a data management system that incorporates monitoring data and produces GIS-based information for Annual Reports and electronic submittals to stakeholders.

Westside Subbasin GSP Hydrogeologic Conceptual Model and Numerical Flow and Solute Transport Model Development (2015 to Present)

Ms. Katarina Campbell, P.E., Senior Resources Engineer, Westlands Water District

559-241-6226, kcampbell@westlandswater.org

Mr. Halligan has directed GSP-support efforts with Ms. Kretsinger-Grabert on behalf of Westlands Water District since 2015. These efforts by Mr. Halligan and Ms. Kretsinger-Grabert have included managing several staff and an outside consultant in data collection, data management system development, evaluation and analysis of data collected from local, state, and federal agencies including over 10,000 well and geophysical logs for the development of a hydrogeologic conceptual model (HCM) that will be utilized in the development of a GSP for the Westside Subbasin. The HCM was instrumental in the construction and development of a basin-wide numerical flow and

solute transport model. LSCE is also developing a groundwater flow and transport model for SGMA and Irrigated Lands Regulatory Program purposes.

Peter Leffler, PG, CHg, Principal Hydrogeologist

Mr. Leffler is a licensed Professional Geologist and Certified Hydrogeologist and has over 25 years of professional groundwater consulting experience in California, including the last three years with LSCE and the preceding 12 years with Fugro Consultants. Mr. Leffler is currently involved in LSCE's efforts in providing consulting services to clients to comply with the SGMA legislation and GSP regulations in several basins in California. He also served as project hydrogeologist for several projects in Paso Robles Groundwater Basin, Atascadero Groundwater Basin, and other groundwater basins in San Luis Obispo County during his tenure with Fugro; including the 2005 Basin Model study, 2009 Groundwater Flow and Transport Model for City of Paso Robles Wastewater Treatment Plant, the 2010 Shandon Community Plan Update Water Resources Evaluation, and peer review of the Basin Model Update in 2014.

Over the past 25+ years, Mr. Leffler has been involved in many other groundwater basin characterization, water balance, modeling, and/or safe yield studies including Kaweah Groundwater Subbasin, Cummings Groundwater Basin, Tehachapi Groundwater Basin, Tracy Groundwater Subbasin, Santa Maria Groundwater Basin, Scotts Valley Groundwater Basin, Antelope Valley Groundwater Subbasin, and Westside Groundwater Basin. He is currently involved in SGMA-related groundwater basin studies for Chowchilla Groundwater Subbasin, Madera Groundwater Subbasin, and Niles Cone Groundwater Basin.

References:

Chowchilla Subbasin Sustainable Groundwater Management Act Data Collection and Analysis and Madera Subbasin Sustainable Groundwater Management Act Data Collection and Analysis (2017)

Ms. Julia Berry, Director, Water and Natural Resources Department, Madera County
559-675-7821, ext. 3451, Julia.Berry@co.madera.ca.gov

Mr. Leffler served as Project Hydrogeologist for two separate studies for Chowchilla Subbasin and Madera Subbasin, both of which are designated as critically overdrafted by DWR. The two studies constitute the initial steps in meeting SGMA GSP requirements involving collection of existing data, preparation of a preliminary hydrogeologic conceptual model (including groundwater conditions), development of a conceptual water budget model, assessment of available data, and data gap assessment. These efforts were documented in Technical Memos for each subbasin in July 2017. Mr. Leffler is involved in ongoing water for Madera Subbasin related to development of a basin water budget that includes assessment of groundwater inflows/outflows and storage change over the base period. Mr. Leffler will continue working as the project hydrogeologist on a project team that was selected to prepare GSPs for each subbasin to be submitted to DWR by January 2020.

Technical Peer Review of Niles Cone Groundwater Basin Alternative (2017)

Ms. Jan Lee, Water Resources Manager, City of Hayward
510-583-4701, Jan.Lee@hayward-ca.gov

Mr. Leffler provided technical peer review of GSP functional equivalency for two Alternatives submitted by Alameda County Water District (ACWD) for the Niles Cone Groundwater Basin. Although ACWD was designated as the exclusive GSA for the Niles Cone Groundwater Basin, Hayward is a key stakeholder because portions of the city overlie the basin. The peer review study focused on the key elements in SGMA/GSP regulations related to basin setting (hydrogeologic conceptual model, groundwater conditions, water budget, and management areas), sustainable

management criteria, and monitoring networks. Assessment of the adequacy of the basin groundwater model was a key component in the overall peer review as it provides the water budget information for the basin. Another key element of the peer review was evaluation of the adequacy of sustainable indicator monitoring points. Our peer review comments were incorporated into submittals provided to DWR from the City of Hayward.

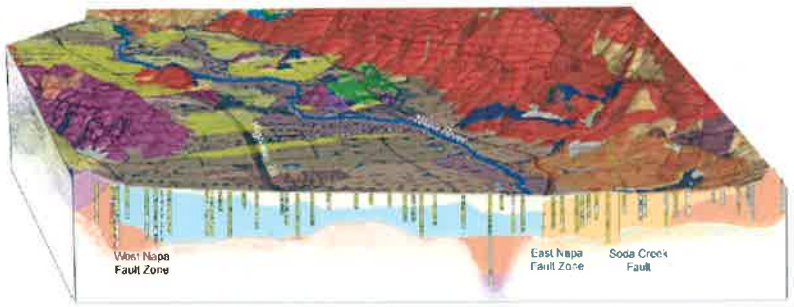
Vicki Kretsinger Grabert, Senior Principal Hydrologist

Ms. Kretsinger-Grabert has over 30 years of experience in groundwater quality assessment and resource management, including design of monitoring networks and programs, application of environmental regulations, long-term groundwater quality monitoring and protection programs, and groundwater supply sufficiency and availability assessments. Vicki has managed county and basin-wide groundwater assessments including groundwater management plans and/or water supply assessments, characterization of groundwater conditions, and monitoring programs. She is the Founding President of the Groundwater Resources Association of California (GRA) and has served on the GRA Board of Directors since 1992. Vicki has organized a new Contemporary Groundwater Issues Council, consisting of local, state, national, and international leaders to provide input on challenges in California groundwater management, co-led the Groundwater Caucus for the California Department of Water Resources' (DWR) California Water Plan Update 2013, and is a member of DWR's Practitioner Advisory Panel providing input to DWR on implementation of SGMA.

References:

Napa County Groundwater and Surface Water Projects (2009 to Present)

Ms. Kretsinger-Grabert and LSCE have been providing varied SGMA and GSP related services to Napa County. These services involved the improved understanding and management of water resources, gathering available groundwater-related data, developing a centralized water resources data system, identifying data gaps, and providing recommendations for the countywide water resources monitoring program. In addition, Vicki has led efforts in developing an updated hydrogeologic conceptualization and characterization of conditions including eight geologic cross-sections and several derivative maps, refining and further characterizing areas of greater recharge potential, and analysis of the potential for surface water/groundwater interactions. Most recently, Vicki led the County's efforts in the preparation and submittal of a GSP alternative demonstrating existing sustainable groundwater management.



- Presentation of analyses and interpretations through reports and associated GIS and graphical products.

Barbara Dalgish, PG, Senior Hydrogeologist

Ms. Dalgish has 14 years of professional experience including 11 years in groundwater consulting with LSCE and 3 years with the U.S. Geological Survey. Experience includes hydrogeologic groundwater studies and evaluations, development and construction of site specific and regional groundwater flow and solute transport models (with particular focus on salt and nitrate);

investigation and assessment of regional geologic and hydrologic conditions for groundwater resource management programs; collection and interpretation of land subsidence data; data management and data management systems; collection and evaluation of soil, surface water, and groundwater quality data; and aquifer parameter estimation using field and analytical techniques. Ms. Dalgish has worked in the Paso Robles Sub-basin since 2013 for agricultural interests that are members of the Shandon-San Juan Water District. Ms. Dalgish evaluated the existing conceptual model of the Sub-basin and updated geologic cross sections previously prepared by CHG as part of the Phase 1 Paso Robles Groundwater Basin Study. This work led to an assessment of potential data gaps in the geologic and hydrogeologic conceptualization in selected areas of the Sub-basin.

References:Ms. Dalgish has been a key LSCE staff for work conducted for the Mendota Pool Group (led by Mr. Halligan), Westlands Water District (led by Mr. Halligan and Ms. Kretsinger-Grabert).

GEOSCIENCE STAFF QUALIFICATIONS

Johnson Yeh, PhD, PG, CHg, Principal Geohydrologist

For more than 26 years, Dr. Yeh has managed groundwater modeling efforts, hydrogeologic investigations, groundwater basin and water quality studies, and artificial recharge projects. He provides project management and technical direction for hydrogeologic investigations, groundwater models, and artificial recharge projects. Johnson performs detailed statistical analysis of various types of data and has been the lead modeler on many high profile projects. He was instrumental in helping to resolve one of the largest groundwater rights cases in California, and developed models that helped a nearby water district to successfully avoid costly litigation. He was the lead modeler for the Update to Paso Robles Subbasin groundwater flow model, and his experience and knowledge will provide the GSAs with utilization of the groundwater model that will help inform future groundwater sustainability strategies and projects.

References:

San Luis Obispo County, Paso Robles Groundwater Basin Model Update (Start date: 2014)

County of San Luis Obispo
Courtney Howard, Water Resources Division Manager
(805) 235-2810, choward@co.slo.ca.us

Dr. Yeh and support staff from Geoscience conducted an update of the Paso Robles Groundwater Basin Model. The update extended the model period for water years 1981-2011, to improve the water balance assessment, refined the perennial yield, and evaluated the basin's response to projected conditions over a 28 year period from 2012-2040. He also helped develop a rainfall-runoff model of the watershed that is tributary to the basin. The watershed hydrologic modeling uses extensive data to characterize the water balance and hydrologic processes that occur in a watershed.

Los Angeles County Antelope Valley Groundwater Rights Adjudication (2015)

Gene Tanaka, Los Angeles County
(951) 686-1450, gene.tanaka@bbklaw.com

Dr. Yeh and Geoscience's modeling and expert witness capabilities were called upon to assist in resolving one of California's largest groundwater rights adjudications. The 16-year-old class action involved competing water rights claims by multiple parties and stakeholders—from individual property owners, agricultural interests, public water suppliers, and the United States government.

Geoscience was retained by attorneys for Los Angeles County to update and refine the USGS Antelope Valley Groundwater Model as part of the adjudication process. The USGS model incorrectly identified and simulated several key components of the water balance for the basin, resulting in a much lower safe yield calculation. The model was calibrated to the court-accepted safe yield value using updated values for groundwater pumping and evaluating the contribution of mountain front runoff—essential for an accurate water balance for the basin. The Geoscience calibrated model was used, along with other evidence, to settle the longstanding dispute, which was recently approved by the court.

The USGS model incorrectly identified and simulated several key components of the water balance for the basin, resulting in a much lower safe yield calculation…

The Geoscience calibrated model was used as along with other evidence to settle the longstanding dispute, which was recently approved by the court...

Brian Villalobos PG, CHg, CEG, Principal Geohydrologist

Mr. Villalobos has more than 28 years of professional experience in geohydrology and environmental geology throughout the Southern California region. His specific areas of expertise are in hydrogeologic investigations to support groundwater sustainability and determine safe yield, water budgets, indirect potable reuse and groundwater recharge. He has studied and modeled the lower San Luis Rey Valley Groundwater Basin, specifically within the Mission Subbasin. Brian has led efforts to develop studies and reports that are required to complete a GSP, including, monitoring well networks, sustainable yield, water budgets and more. He currently works for several cities and water districts to sustainably manage their groundwater resources, including the city of Oceanside, Olivenhain Municipal Water District, Rancho California Water District, Elsinore Valley Municipal Water District, San Bernardino Valley Municipal Water District, and others. Mr. Villalobos was the project manager and led efforts along with Dr. Yeh to update the Paso Robles Groundwater Basin Model. He also helped develop a rainfall-runoff model of the watershed that is tributary to the Basin.

References:

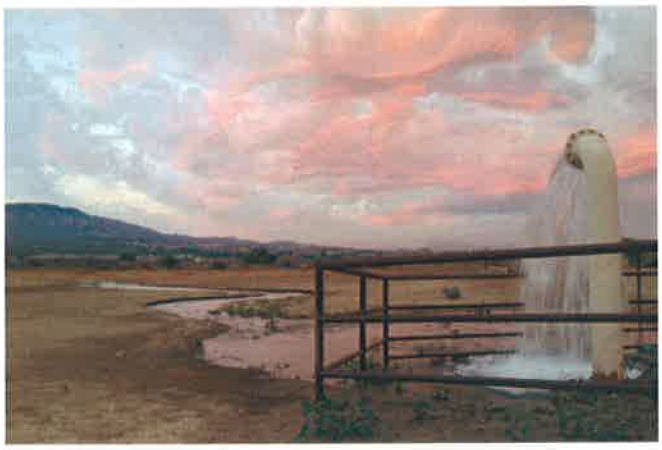
San Bernardino Valley Municipal Water District Usable Capacity and Safe Yield for the Yucaipa Basin Area (2012-2013)

San Bernardino Valley Municipal Water District
Bob Tincher, Engineering and Planning Manager,
(909) 387-9215
bobt@sbvmwd.com

Mr. Villalobos was the Project Manager for Geoscience in determining both the usable capacity and the maximum sustainable yield for a series of groundwater basins within the Yucaipa Basin area. The first stage of the project included background research data collection, and review, followed by the development of a layered base map to visually display project results.

Following this step, the geology and hydrology of the project area were characterized using data amassed in the project's initial stage. The usable storage capacity of each newly-delineated subbasin was then determined and sustainable yields were calculated for each subbasin using a water balance technique.

Rancho California Water District Groundwater Management Program and Water Audit (1988 to Present)



Andrew Webster, Rancho California Water District
(951) 296-6900, webstera@ranchowater.com

Geoscience has been the District Hydrologist for Rancho California Water District since 1988. Mr. Villalobos has been involved in the preparation of an integrated groundwater and streamflow model of the Murrieta Temecula groundwater basin; conducted annual water audits to provide recommended production; conducted an artificial recharge study and implementation of the VDC Recharge Ponds; as well as troubleshoot well issues and/or site and supervise construction on over 23 large-scale production wells.

CHG STAFF QUALIFICATIONS

Timothy Cleath, PG, CEG, CHg, President, Principal Hydrogeologist

Mr. Cleath has an extensive understanding of water resources gained through over 30 years of hands-on experience with water issues on the Central Coast. Mr. Cleath has been involved with groundwater management and supply projects in the Paso Robles Groundwater Sub-basin for over 30 years. He contributed to the Paso Robles Basin Groundwater Management Plan, the Paso Robles Groundwater Subbasin Water Banking Feasibility Study, and the Phase I Paso Robles Groundwater Basin Study, among many other projects. He has assisted public agencies and private landowners in the Sub-basin on a wide range of groundwater-related issues, including groundwater supply development, artificial recharge projects, sustainable groundwater management, basin boundary definition, and groundwater quality.

References:

Chalk Mountain Subbasin (Cuyama Valley) investigations, 2017

James Ontiveros, Grapevine Capital Partners
(805)705-9085, james@grapevinecap.com

Mr. Cleath has been managing an investigation of the western Cuyama Valley Groundwater Basin that is leading to a Basin Boundary Modification Request to establish a separate Chalk Mountain Subbasin. This investigation addresses the portion of the DWR Bulletin 118 Cuyama Valley Groundwater Basin that was excluded by groundwater studies recently completed by the County of Santa Barbara and the USGS. Mr. Cleath directed development of a hydrogeologic conceptual model of the proposed subbasin that includes detailed scientific internal boundary studies along the Russell fault, evaluating offset on the Russell fault, and a groundwater flow barrier assessment along the Russell fault.

Hydrogeologic Study and Groundwater Recharge Analysis, San Luis Obispo Valley Groundwater Basin, 2017 (Performed under subcontract with Water Systems Consulting)

Miguel Barcenas, City of San Luis Obispo
805-781-7807, MBarcenas@slocity.org

Mr. Cleath is directing the hydrogeologic characterization of the San Luis Obispo portion of the San Luis Obispo Valley Groundwater Basin, including a numerical modeling analysis of recharge using reclaimed water. The City has excess reclaimed water, currently being released to San Luis Obispo Creek downstream of the basin, that could be stored in the groundwater basin and utilized by existing and new City wells. The modeling analysis is evaluating the available groundwater storage capacity, City groundwater extraction scenarios, and opportunities for enhancing groundwater sustainable yield.

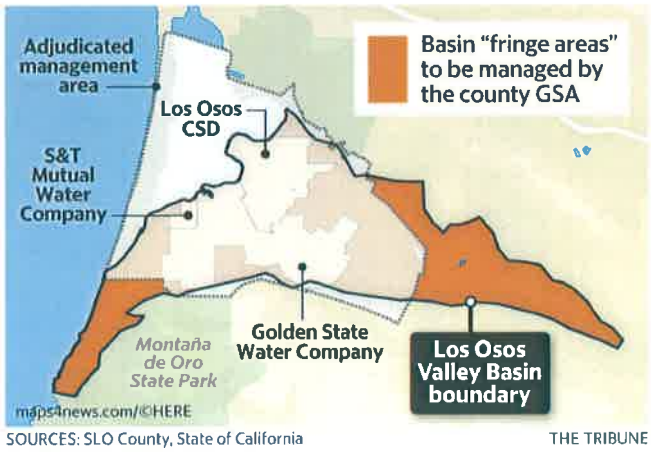
Spencer J. Harris, PG, CHg, Senior Hydrogeologist

Mr. Harris has managed public agency and water company projects in San Luis Obispo County for over 20 years, and has 10 years prior experience in geophysical exploration and environmental consulting. Mr. Harris' background provides the experience and understanding necessary to assess difficult issues, such as sustainable yield, salt and nutrient loading, and GW-SW interactions. Mr. Harris has provided hydrogeologic expertise on major studies, public works projects, and management efforts in the Paso Robles Groundwater Subbaasin, including the City of Paso Robles Nacimiento Water Recovery Well Project, the Paso Robles Basin Groundwater Management Plan, and both phases of the Paso Robles Groundwater Basin Study. Mr. Harris has performed basin characterization work and developed conceptual models for many Central Coast basins, including the key hydrogeologic cross-sections and management area boundary definitions for the Paso Robles Groundwater Subbasin.

References:

Los Osos Groundwater Basin Plan Update and Implementation (2015-17)

Rob Miller, PE. Executive Director, Los Osos Basin Management Committee
(805) 544-4011, robm@wallacegroup.us



SOURCES: SLO County, State of California THE TRIBUNE

Mr. Harris was the technical lead and primary contributor on hydrogeology for the Los Osos Basin Plan (Plan). The Plan was used for basin adjudication and includes a physical solution for managing the basin, with measurable objectives, a comprehensive monitoring program, and water use efficiency and infrastructure programs designed to achieve sustainable management of groundwater resources. Mr. Harris developed the hydrogeologic conceptual model and a dual-density (SEAWAT) groundwater model, performing studies on basin sustainable yield, seawater intrusion mitigation, agricultural and private domestic water use, climate change impacts, and stream/aquifer interaction. Mr. Harris currently manages an extensive groundwater monitoring program in the basin with over 70 wells, and prepared the 2015 and 2016 Annual Reports.

Characterization and Boundary Modifications for the Fringe Areas of the Los Osos Groundwater Basin (2016-17)

Catherine Martin, Water Resources Engineer, San Luis Obispo County, Dept of Public Works
(805) 781-5275, cmmartin@co.slo.ca.us

Mr. Harris is managing a hydrogeologic characterization project in support of a Basin Boundary Modification Request and future GSP for the non-adjudicated fringe areas of the Los Osos Valley Groundwater Basin. Mr. Harris has managed the project through productive and informative agency and stakeholder meetings, and has demonstrated not only the required technical understanding for SGMA compliance, but has also built a partnership with the agricultural land stakeholders that resulted in a successful hydrogeologic field investigation.

STILLWATER SCIENCES STAFF QUALIFICATIONS

Dr. Bruce Orr, Senior Ecologist

Dr. Bruce Orr has over 25 years of experience leading complex projects involving natural resource inventories, integrated natural resource management plan development, and federal and state regulatory processes. He has led numerous multi-disciplinary restoration feasibility and planning studies that incorporate hydrologic and water resource management planning, instream flow needs, and groundwater inputs in major watersheds throughout California (San Joaquin, Sacramento, Merced, and Santa Clara rivers). Dr. Orr provides senior strategic support and direction on many of Stillwater's large-scale regulatory, watershed management, and restoration projects. He was a senior member of the consultant team hired by the U.S. Bureau of Reclamation to provide technical support to the multi-agency team charged with implementing the restoration along 150 miles of the San Joaquin River. He was co-organizer of the recent Riparian Summit 2017 at UC Davis and currently serves on a variety of science advisory committees, including the Santa Clara Valley Water District Science Hub and the CNPS Vegetation Committee, with a focus on his expertise in river, riparian, and floodplain wetland ecology and management, including groundwater dependent ecosystems.

References:

San Joaquin River Restoration Planning and Implementation (2002 – 2015)

US Bureau of Reclamation, Friant Water Users Authority, and Natural Resources Defense Council
Monty Schmitt
(510) 325-3594
Key Staff: Dr. Bruce Orr. Ethan Bell

Stillwater Sciences has been supporting restoration and monitoring efforts in the San Joaquin River basin for over 15 years. Stillwater's early work was instrumental in developing a comprehensive understanding of riparian vegetation dynamics and its dependency on surface water and groundwater in the San Joaquin River below Friant Dam in support of the settlement agreement reached in 2006. As part of this effort, Stillwater developed the San Joaquin River Riparian Recruitment Model and integrated model output, current and historic aerial photography, soil texture and salinity, depth to groundwater, relative elevation (height above river), and targeted field studies to develop reach-scale restoration objectives under various flow release scenarios.

Ethan Bell, Senior Fisheries Biologist

Mr. Bell is a senior fisheries biologist, based in San Luis Obispo County. He has provided technical expertise on a wide variety of interdisciplinary projects, including instream flows, large-scale watershed assessments, fish passage analysis, population dynamics modeling, limiting factors

analysis, and endangered species consultation. He has worked in rivers and watersheds throughout California and has focused experience in San Luis Obispo County regarding the integration of physical and biological data to determine ecological and instream flow requirements to support ecosystem health. He recently served as the Aquatic Resources Technical Lead for a pilot study to locate areas with relatively high intrinsic percolation (or groundwater-recharge) potential that, through management actions, could enhance local groundwater supplies for human and ecological benefits in the Upper Salinas basin.

Hydrologic Effects of the Freeman Diversion Dam Proposed Operations on the Santa Clara River Estuary and Riparian Habitats (2012 – present)

Catherine McCalvin, United Water Conservation District

(805) 535-8220

Key Staff: Dr. Bruce Orr. Ethan Bell

Located approximately ten miles upstream from the Santa Clara River mouth, Freeman Diversion Dam is a broad-crested weir and grade stabilization structure that allows for continued river flow diversion by United Water Conservation District for both direct and in-lieu recharge to the over-drafted and seawater-intruded aquifers of the Oxnard Coastal Plain. To maintain operations, United Water is required by federal regulations to develop a Habitat Conservation Plan (HCP) that: (a) describes the flow diversion activities sought to implement (called "covered activities"); (b) describes how these activities affect resident species listed under the Endangered Species Act and other identified species of concern; and (c) sets forth appropriate conservation measures intended to minimize and mitigate the effects from these covered activities on covered species.

ERA STAFF QUALIFICATIONS

Duncan MacEwan PhD, Principal Economist

Dr. MacEwan specializes in the economics of water resources and agriculture, applied mathematical modeling, and statistical analysis. Some of his current projects include benefit-cost analyses, feasibility studies, agricultural impact analyses, and water valuation and risk assessments. Duncan is an expert in agricultural economic analysis to support feasibility studies and economic impact analyses related to water management and project development. He remains actively engaged in developing economic methods and has published on topics including the impacts of sustainable groundwater management, water quality management, and calibrated economic modeling methods.

References:

Kern Delta Water Allocation Plan Supplemental EIR, 2015 – Present

Mark Mulkay, General Manager, Kern Delta Water District, Bakersfield, CA

(661) 834-4656, Mark@kerndelta.org

Estimate the economic impacts of changes in surface water supply and groundwater pumping in Kern Delta Water District and areas north of the Kern River. The economic analysis includes the development of a linked groundwater and economic model that is used to estimate agricultural water use, production, and economic value under project alternatives. The analysis will be used in the Supplemental Environmental Impact Report (SEIR) prepared in support of the Kern River Water Allocation Plan.

Agricultural Impact Analysis of Groundwater Pumping Charges, 2013 – 2014

Linda Arluck, Senior Management Analyst, Santa Clara Valley Water District, San Jose, CA, 408-630-3068, llouie@valleywater.org

Developed an economic model of Santa Clara County agriculture to evaluate the fiscal and land use impacts to agriculture from decreasing the Open Space Credit (increasing the groundwater pumping charge). Presented findings at a series of public workshops and to the Board; the groundwater charge was left unchanged.

CBI STAFF QUALIFICATIONS

Julia Golomb, Associate

Julia has seven years of experience as a mediator and facilitator, with a rich background in local, state and national environmental management issues. Julia's primary practice areas include water, agriculture, energy, climate mitigation and adaptation, and land use planning. Prior to joining CBI, Julia worked at Kearns & West in San Francisco, where she facilitated multi-stakeholder environmental management processes. In addition to her work with CBI, Julia coordinates the California Agricultural Mediation Program (CALAMP), which provides free mediation to the agricultural community in California. Julia holds a Masters in Environmental Management from Yale University.

References

Salinas Valley New Public Groundwater Agency Governance Structure, 2016-2017

Gary Petersen, General Manager, Salinas Valley Basin GSA
(650) 587-7300 x84, gpetersen@rgs.ca.gov

Julia facilitated a diverse collaborative stakeholder group in reaching agreement on the governance for groundwater sustainability agency, including voting, board composition, and legal structure. To support a transparent collaborative process and robust public outreach program, CBI developed a Stakeholder Outreach and Engagement Plan, outreach materials, and a website (www.svbgsa.com), managed an interested parties email list, and coordinated efforts to engage Spanish-speaking communities.

SGMA Implementation in the Cosumnes Subbasin, (2017-Present)

Tom Gohring, Executive Director, Sacramento Water Forum
(916) 808-1993, tgohring@waterforum.org

Julia currently provides strategic planning support and facilitates two separate work groups tasked with developing a collaborative approach to sustainably managing groundwater usage in the Cosumnes Subbasin. Additionally, Julia manages public outreach and engagement, including development and ongoing management of a project website (cosumnes.waterforum.org). She built and maintains an interested parties email list with 200 subscribers, designs communication materials, and plans and facilitates public workshops. The subbasin recently submitted a Proposition 1 grant funding application and is now beginning GSP development.

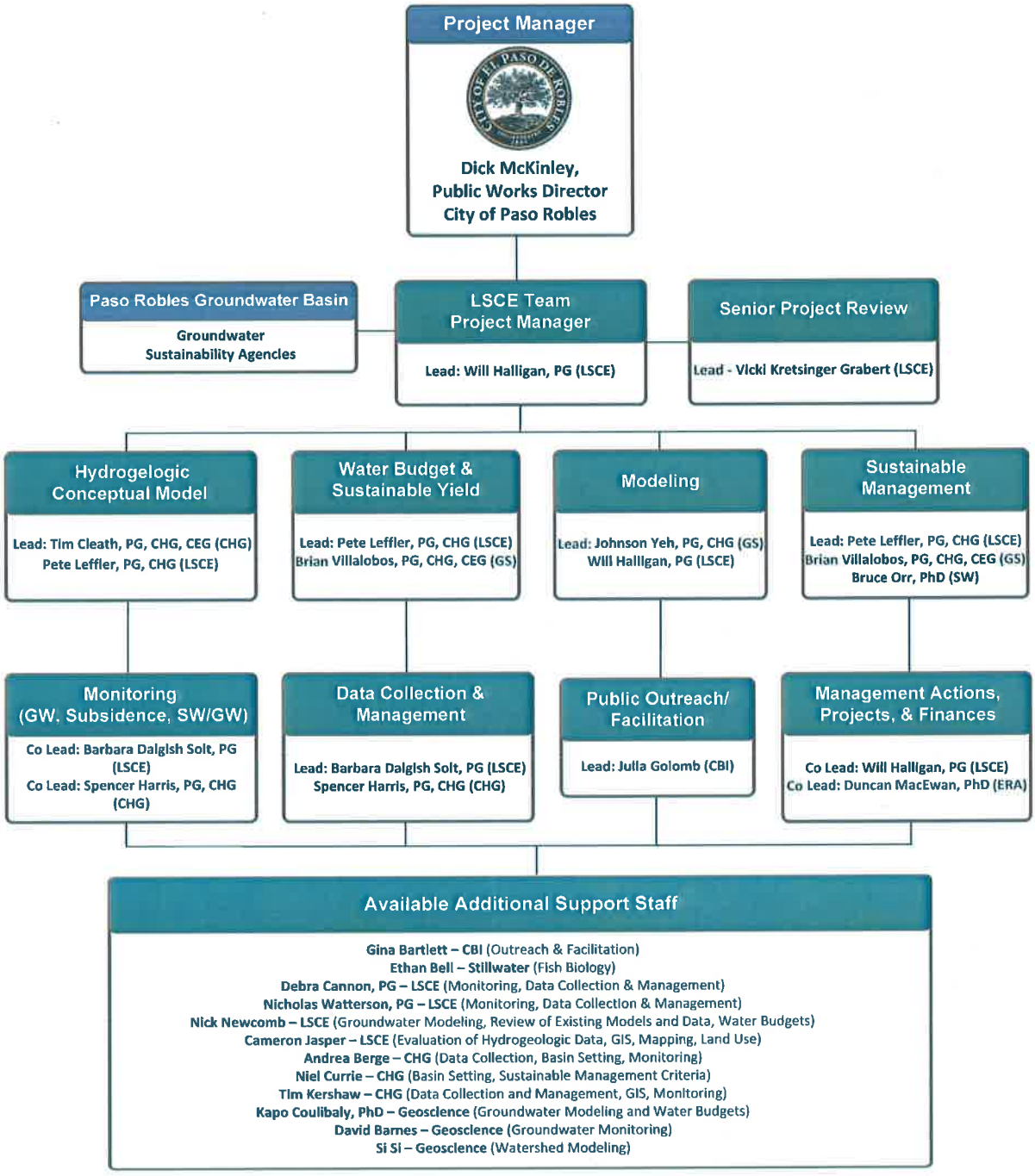
2. Staffing

The proposed key personnel and organization of the LSCE Project Team are presented on the organizational chart and staffing figure (Figure 1) below. Working under the administrative direction of Paso Robles Subbasin GSAs project manager, our Project Team will be led by Will Halligan, who would serve as the Project Manager. Pete Leffler, Barb Dalgish, Tim Cleath, Spencer Harris, Johnson Yeh, Brian Villalobos, Bruce Orr, Duncan MacEwan, and Julia Golomb will be the task

leaders for the various elements of GSP development. These task leaders will be supported by support and alternate staff from the six firms of the Project Team as noted on the organization chart. Vicki Kretsinger Grabert will provide senior technical review for this project.

PROJECT CONTACT INFORMATION:

Project Manager: Will Halligan, Luhdorff & Scalmanini Consulting Engineers
Address: 500 1st Street, Woodland, California 95695
Phone and Email: 530-661-0109; Whalligan@LSCE.com



3. Approach

In this section, we discuss the LSCE Project Team's approach to developing one GSP for the Paso Robles Sub-basin. The objective is to complete a GSP that achieves sustainable groundwater management by 2040 in the most cost-effective manner possible. The Approach is composed of 13 tasks described below.

Task 1 Compile and Organize Data

As described in the RFP, this task will involve compilation of climatic, soils, land use, water supply sources/deliveries, hydrogeologic, water quality, surface water, and groundwater data, updating and checking of datasets, and data organization in a project data management system (DMS). The data collection and organization effort will encompass the groundwater basin as defined by DWR Bulletin 118 in both San Luis Obispo and Monterey Counties. References will also be compiled, and a list of technical studies and references maintained for the project. Details regarding organization of a DMS are provided under Task 8.

Task 2 Develop Introductory and Administrative Information

Task 2 will primarily involve meeting SGMA regulations under 354.2 – 354.6. Among other items, this will include an estimate of GSP implementation costs and will discuss the GSA's plan to fund those costs. This task will include development of the purpose and goal of the GSP, and documentation of GSA organization, management structure, and legal authorities. Much of the information for this task is in existing documents, including GSA applications previously submitted to the DWR and the draft feasibility study of management actions and projects developed in 2016 for the County. Information gathered and developed for this task will be updated to comply with GSP regulations (see also Task 9).

Task 3 Describe the Plan Area

This task will involve meeting GSP regulations under 354.8 and 354.10.

Subtask 3.1. Description of Plan Area: As required in GSP regulations, this task provides a description of the plan area (San Luis Obispo portion of Paso Robles Groundwater Basin) for the GSP. It will include maps of the plan area, as well as adjacent groundwater basins (including Monterey County portion of Paso Robles Groundwater Basin). Federal, state, and local agencies within the plan area will be identified, along with their respective authorities regarding water resources and land use. Maps to be developed will delineate jurisdictions, water purveyor service areas, wells, and land use designations. A preliminary description of monitoring and management programs will be provided. This task will also include summarizing General Plans, specific plans, and other planning documents that impact water and land use. The Project Team will rely on the existing GSAs in the Basin to provide planning documents and other required information in the task that will enable the LSCE Project Team to summarize and present this information in the GSP.

Subtask 3.2. Notice and Communication: This task summarizes notifications and communications by the GSAs with interested parties and stakeholders. This summary will include a list of workshops and public meetings regarding the GSP along with a summary of comments received. Additional details regarding notice and communications are provided in Task 11.

Task 4 Describe the Basin Setting

This task will involve meeting SGMA regulations under sections 354.14 through 354.20.

Subtask 4.1. Hydrogeologic Conceptual Model: Subtask 4.1 will describe the Hydrogeologic Conceptual Model (HCM) as required under section 354.14 of SGMA regulations. This will include description of the regional geologic and structural setting, lateral and vertical basin boundaries,

principal aquifers/aquitards (including aquifer parameters), identification of data gaps and uncertainty, scaled geologic cross-sections, topography, surface geology, soils, recharge and discharge areas, surface water bodies, imported water supplies, and climate information. Much of the work under this task will involve use of existing data and graphics, some of which may require expansion to incorporate the full basin area delineated by DWR. Given the availability of several scaled geologic cross-sections from the 2002 Basin study, additional cross-section work for GSP development will likely be limited to updating water levels on the cross-sections and some limited new cross-sections to characterize management areas (if needed). Mapping of recharge and discharge areas will involve updating previously conducted work or some new work to be conducted during GSP development.

Subtask 4.2. Groundwater Conditions: Subtask 4.2 will describe groundwater conditions as required under the GSP regulations (354.16). As defined under GSP regulations, groundwater conditions encompass information related to groundwater elevations, groundwater storage, seawater intrusion (although not applicable to this basin), groundwater quality, land subsidence, groundwater – surface water (GW-SW) interaction, and groundwater dependent ecosystems (GDEs). Key aspects of this subtask will include: 1) preparation of updated hydrographs from a selection of geographically distributed CASGEM-complaint wells; 2) evaluation of groundwater storage change over a balanced hydrologic period; 3) documentation of groundwater quality consistent with GSP regulations; 4) and documentation of GW-SW interaction and GDEs. While statewide mapping of GDEs is expected from DWR and will be reviewed in this subtask, the Project Team will also conduct basin-specific evaluations of GDEs that consider GDE relationships to perched versus regional aquifer systems, known springs and wetlands, and habitat considerations (e.g., instream flow requirements, threatened/endangered species, and critical habitat). It is anticipated that the groundwater model may also be utilized in evaluation of GW-SW interaction and GDEs.

Land subsidence due to declining groundwater levels has been reported in the Paso Robles Groundwater Basin based on results from Interferometric Synthetic Aperture Radar (InSAR) (Valentine et al. 2001. USGS Open-File 00-447). The report indicates 0.6 to 2.1 inches of land subsidence 3 miles northeast of Paso Robles and 1 to 2 in the Atascadero area as of 1997. It is also important to note that water levels in the area 3 miles northeast of Paso Robles have declined an additional 30 ft to 55 ft from fall 1997 to fall 2016. Land subsidence with will further evaluated in this task based on available data, and an optional modeling scope for subsidence is provided in Task 5.5.

Subtask 4.3. Water Budget: Subtask 4.3 will quantify the water budget as required under the GSP regulations (354.18). This subtask will also include identification of overdraft and an estimate of sustainable yield. The required water budget will quantify groundwater/surface water inflows, groundwater/surface water outflows, and change in storage. A typical water budget includes a surface layer component (e.g., infiltration from precipitation, excess irrigation water, and streamflow) and a subsurface component (e.g., bedrock inflows/outflows, lateral inflow/outflow from adjacent groundwater basins). Previous studies, dating back to the 2002 Paso Robles Basin Groundwater Basin Study, have included quantification of the basin water balance (for the basin area defined in the 2002 Study). This subtask will involve detailed review of previous water balance studies and updating of the water balance to be inclusive of basin boundaries as defined by DWR Bulletin 118. This work will also need to be coordinated with the GSAs in the Monterey County portion of the basin.

As required under the GSP regulations, water budgets will be developed for historical, current, and projected future conditions. The current numerical flow model of the Basin can provide the basis for evaluation of historical water budgets. The existing basin groundwater model is based on the

hydrologic time period from 1981 to 2011, which represents a balanced hydrologic period that includes representative dry, wet, and average conditions. The 1981-2011 period is considered representative and suitable for the historical conditions water budget.

The future projected hydrology will be based on 50 years of historical hydrologic data for precipitation, streamflow, and evapotranspiration. Fifty years of historical precipitation, evapotranspiration, and stream flow information will be developed based on accepted scientific practices. Future water balance simulations will include a future baseline scenario and various alternative management scenarios designed to achieve sustainability. Future hydrologic projections will also include consideration of climate change.

Since the existing simulation period of the groundwater model does not extend through 2015 (which is the "current" baseline designated in the GSP regulations), this task will utilize a year in the existing model simulation period to approximate 2015 current baseline conditions for water budget purposes. As described under Task 5, it is highly recommended that modeling work during GSP development include extending the model simulation period to encompass 2015.

Sustainable yield occurs when the Basin is in balance following the removal of temporary surplus and overdraft conditions do not exist. This often occurs when the outflows are not greater than the inflows over a selected multi-year time period, e.g., 30 years, that represents balanced or average hydrologic conditions. In addition, sustainable yield calculations under SGMA require that no undesirable results occur as defined in the GSP. As such, the sustainable yield translates to the amount of groundwater pumping that can safely be sustained without producing undesirable results related to groundwater levels/storage, subsidence, groundwater quality, SW – GW interactions, GDEs, or subsurface lateral outflow to neighboring basins. Sustainable yield will be estimated using the water budget and groundwater model results developed in subtask 4.3 and Task 5.

Subtask 4.4. Define Management Areas (Optional Task): Potential management areas will be evaluated based on hydrogeologic characteristics and jurisdictional boundaries. Hydrogeologic criteria to be considered will include, but not necessarily be limited to, geologic conditions, groundwater elevations, groundwater quality, and GW – SW interaction. Variations across the basin in these hydrogeologic criteria may be used to help delineate potential management areas. Jurisdictional boundary criteria will include agency boundaries and potential impacts on the water budget. Various criteria will be evaluated and proposed management areas, if any, selected for presentation to the GSAs for further discussion and consideration. The Project Team will work with the GSAs to establish the final management areas (if any).

Task 5 Prepare Surface Water - Groundwater Flow Model

The RFP outlines four primary options for how to proceed with groundwater modeling for the GSP. The base scope proposes to develop the GSP using the "As-Is Option" for modeling (Subtask 5.1). This task will also include detailed evaluation of the model and development of recommendations for future improvement of the model following GSP development. Contingent upon grant funding, our scope includes three optional tasks for model update and refinement. Work under this subtask will be closely coordinated with work conducted under subtask 4.3.

Subtask 5.1. Utilize Model As-Is: This subtask involves use and application of the existing groundwater model (GeoScience, 2014/2016) without further updates. While we recommend certain model updates be made during GSP development, we recognize such modeling options are likely grant dependent. Therefore, this subtask assumes use of the basin groundwater model documented in the 2014 and 2016 model reports.

Subtask 5.2. Option for Model Geographic Expansion: The Paso Robles Groundwater Basin boundary as defined in the 2002 report is smaller than the DWR Bulletin 118 2016 boundary – especially in the southeast portion of the study area. Pending availability of funding, the hydrogeologic criteria used to define the groundwater basin boundary in the 2002 report would be revisited in light of SGMA regulations to determine if geographic expansion of the model domain is warranted. If it is determined necessary and useful to expand the model domain, the model will be updated to include the full DWR Bulletin 118 boundary. If it is determined that such a model expansion is not needed or required, the justification and rationale for maintaining the existing model domain boundary will be provided.

Subtask 5.3. Option for Model Base Period Update: The existing model base period is from 1981 to 2011. Since the mandated SGMA baseline for current conditions is 2015 and given the current availability of data for 2012 to 2016, it is highly recommended that the model be updated and recalibrated through 2016. This model update would be valuable for GSP purposes as it would then be representative of current land use conditions and would be help in evaluating the mandated 2015 baseline.

Subtask 5.4. Option for Model Recharge Update: Given that some concerns remain from the previous Basin Model Update peer review (conducted in 2014-2015) related to calculation of rainfall recharge and irrigation return flow in agricultural and urban areas, this optional subtask would involve use of the State of California's Irrigation Demand Calculator program to estimate rainfall recharge and irrigation return flows. These estimates would be compared with existing model values and the model would be updated and recalibrated as necessary.

Subtask 5.5. Option for Subsidence Package Update: In order to evaluate the existing and future potential land subsidence (i.e., elastic compaction and expansion, and inelastic compaction of compressible aquifers) for the Paso Robles Groundwater Basin, an optional task is proposed to incorporate the Subsidence and Aquifer-System Compaction (SUB) Package into the existing Paso Robles Groundwater Basin Model. The SUB Package is used in conjunction with MODFLOW (computer code used for the existing Paso Robles Groundwater Basin Model) to simulate the time-dependent drainage and compaction of compressible aquifer strata. The subsidence model will be calibrated against the InSAR survey data reported by the USGS and any additional local data collected for this task. Land subsidence under historical and current conditions will be established based on results from the calibrated Paso Robles Groundwater Basin Model. The SUB Package will also be included in all predictive model runs to assess the potential land subsidence under future conditions.

Task 6 Identify Sustainable Management Criteria

This task will involve meeting GSP regulations under 354.22 through 354.30.

Subtask 6.1. Sustainability Goal: The Project Team will work with the GSAs and basin stakeholders to define the sustainability goal in accordance with GSP regulations. The sustainability goal will define how groundwater is to be managed over the 20-year implementation phase and ultimately result in an absence of undesirable results.

Subtask 6.2. Undesirable Results: Undesirable results are defined as significant and unreasonable effects for one or more sustainability indicators caused by groundwater conditions in the basin. The applicable sustainability criteria include groundwater levels, storage, water quality, subsidence, and interconnected surface water. The Project Team will work with basin stakeholders to define undesirable results. The Project Team will provide a description of basin groundwater conditions that would lead to undesirable results, criteria used to determine when undesirable effects occur, and potential effects of undesirable results (e.g., on beneficial uses/users, land use/property interests).

The Project Team will also evaluate the metrics to define undesirable results for given sustainability indicators (e.g., measurements at representative monitoring sites). Model results will be used to help evaluate the key sustainability indicators including: groundwater level and storage changes, GW-SW interactions, and potential GDE impacts. Historical land subsidence data and relationships to groundwater level variations will be utilized to assess the effects of subsidence in the Basin.

Subtask 6.3. Minimum Thresholds: The Project Team will develop minimum thresholds for each applicable sustainability indicator in the Basin. Minimum thresholds are a numeric value for each sustainability indicator used to define undesirable results. Sustainability indicators are expected to include: groundwater levels, groundwater storage, water quality, land subsidence, and interconnected surface water. The minimum thresholds will be set at levels for which, if they are exceeded, undesirable results may be expected to occur at significant and unreasonable levels. Justification for each minimum threshold will be provided. The Project Team will describe relationships between the various minimum thresholds for each sustainability indicator, minimum thresholds will be described in terms of their effects on the beneficial uses and users of groundwater, and a description will be provided of how selected minimum thresholds avoid causing undesirable results in adjacent basins. Furthermore, the Project Team will describe how minimum thresholds impact land uses and property interests, how minimum thresholds relate to regulatory standards, and how minimum thresholds will be measured and consistent with monitoring network requirements.

Subtask 6.4. Measurable Objectives: The Project Team will develop measurable objectives for each sustainability indicator that provide for sufficient operational flexibility under adverse conditions and that consider overall levels of uncertainty. Measurable objectives will include interim milestones in increments of five years to achieve overall sustainability within the 20-year implementation period (by 2040).

The minimum thresholds would be used to help develop measurable objectives for each sustainability indicator, or critical parameter, as required in the GSP. Measurable objectives will be based on minimum thresholds, and like minimum thresholds, will represent quantitative values but will be selected to provide operational flexibility in the case of extenuating or adverse circumstances (e.g., a long-term drought). The measurable objectives will represent the end goal toward sustainable groundwater management (e.g., achieving sustainable yield with no overdraft and a basin in balance) that can be achieved in 20 years. Interim milestones for each measurable objective would be provided in increments of 5 years, on the path to achieving sustainable groundwater management via the measurable objective.

Task 7 Establish Monitoring Networks and Protocol

This task will be designed to meet GSP regulations under Subarticle 4 (Monitoring Networks) and section 352.2 (Monitoring Protocols) of Subarticle 3. Work to be conducted under this task will also consider best management practices (BMPs) developed by DWR for monitoring networks and protocols.

Subtask 7.1. Identify Monitoring Network Objectives: The monitoring plan in the GSP will include a description of monitoring network objectives. Overall, the Project Team will develop a monitoring plan that demonstrates progress towards achieving measurable objectives, monitors impacts to beneficial uses/users, monitors changes in groundwater conditions, and helps quantify annual changes in water budget components.

Subtask 7.2. Evaluate Existing Monitoring Programs: The Project Team will review existing groundwater and surface water monitoring programs in the Basin, which include monitoring conducted by the County and other local agencies and stakeholders. The Project Team will develop

a monitoring plan that builds upon existing monitoring programs in the Basin, and describes a network that provides sufficient data to describe short-term, seasonal, and long-term trends in groundwater and related surface water conditions. Monitoring data will be stored in a Data Management System (Task 8) and reported to DWR in annual reports.

Subtask 7.3. Assessment of Monitoring Gaps and Description of Monitoring Network: The Project Team will review the existing monitoring programs and identify gaps in available monitoring data for groundwater levels, groundwater quality, SW-GW interaction, and land subsidence. These gaps will be outlined along with potential approaches for filling the gaps.

Based on the HCM and groundwater conditions assessment, a subset of monitoring sites will be selected to be representative of overall basin conditions and of conditions in each management area (if any) for each sustainability indicator. The monitoring network will be designed and tailored to meet GSP requirements to track each applicable sustainability indicator. Monitored wells will be selected and grouped to provide representative data for a particular geographic and hydrogeologic condition. The Project Team will describe how the network will be developed, implemented, and monitored to provide sufficient spatial and temporal coverage to obtain sufficient data for each sustainability indicator. Local stakeholder input will be crucial for participation and cooperation in this tailored approach to the monitoring network, especially for groundwater levels and groundwater quality.

Subtask 7.4. Develop Monitoring Protocols: The Project Team will develop standard protocols for the monitoring network. Protocols will be developed for collection of groundwater level data, groundwater quality data, surface water stage and flow, land subsidence, and drilling, installation, and development of new dedicated monitoring wells (if any in the future).

Task 8 Organize Data Management System

Task 8 is closely related to work being conducted under Tasks 1 and 7. This task will involve development of the preliminary Data Management System (DMS), including quality control procedures that are sufficient to support the water budget and other GSP analyses. Work on this task will be closely coordinated with San Luis Obispo County, Atascadero GSP, and Monterey County GSPs.

The Project Team will compile data into a preliminary, non-proprietary DMS capable of submitting data to DWR per GSP requirements. It is anticipated that the DMS will build upon existing databases maintained by the GSAs and data formats will include Excel, Access, and GIS. High priority quality control procedures will be developed, and QC procedures will be implemented and tested. GSP data will be organized into standardized data sets using typical formats for surface water and groundwater data. As part of this task, the GSAs may consider what DMS capabilities and characteristics are useful, and may consider use of a DMS software package.

Task 9 Develop and Analyze Projects and Management Actions

This task is intended to meet requirements under the GSP regulations (354.44) to describe projects and/or management actions that will achieve the basin sustainability goal. Considerable work has been completed in previous studies of potential projects and management actions, culminating with the January 2017 Supplemental Supply Options Feasibility Study. The Feasibility Study noted that, "…the expected average annual deficit in the basin (32,844 AFY) exceeds the projected average annual supplemental supplies available (20,000 AFY)." The recent study paints a somewhat bleak picture of large amounts of expensive supplemental water being needed to even approach bringing the basin into balance. It is important to recognize, however, the future baseline scenario against which those supplemental water scenarios were compared uses a projected growth in water use

based on an assumed future growth factor. This results in an estimate of projected overdraft (in terms of average annual groundwater storage change) of greater than 30,000 AFY compared to the historical deficit, which has been no more than about 3,000 AFY for recent historical conditions (as of 2011). In terms of SGMA requirements and overall finances for basin stakeholders, the Project Team believes a future projected baseline should be considered that is more representative of recent historical and current conditions without incorporation of an uncertain assumed future growth factor.

Subtask 9.1. Identification of Projects and Management Actions: The Project Team will develop a preliminary list of potential projects and management actions that build upon previous efforts to help in achieving sustainable yield and avoiding overdraft. This list will be reviewed with the GSAs and additional projects identified, if necessary.

Subtask 9.2. Develop Pre-feasibility Costs and Benefits of Projects and Management Actions: The Project Team, in conjunction with GSAs, will refine pre-feasibility costs and benefits of the identified projects and management actions, making maximum use of past studies, to identify the most promising projects. Project/management actions considerations will include: benefit to measurable objectives, circumstances for implementation, public noticing, permitting and regulatory process, schedule, expected benefits, how it will be accomplished, legal authority required, estimated costs and plan to meet costs, management of groundwater extraction/recharge, and relationship to GSP elements. The resulting list of projects and management actions will be prioritized by cost effectiveness to select the most optimum potential projects for detailed evaluation.

Subtask 9.3. Evaluate and Select Projects and Management Actions: The project evaluation will include assessment of both hydrogeologic and economic feasibility of each potential project. Economic and financial feasibility are assessed in separate, but related, evaluations that are used to quantify costs, benefits, and project tradeoffs to determine whether the project is affordable and a cost-effective use of resources. A project is economically feasible if the benefits of the project are greater than the costs over the economic life of the project, and there is no lower-cost way to achieve the same level of benefits. A project is financially feasible if the additional revenues generated by the project are sufficient to cover the costs of the project. That is, economic feasibility concerns the value of the project to stakeholders, relative to all other alternatives, financial feasibility determines whether the project is affordable, and the combined analyses are important for screening, vetting, and identifying preferred projects for managing limited groundwater supplies in the basin. It is anticipated that the groundwater model developed for the basin will be used as part of the hydrogeologic assessment to help in evaluating the net benefit to the basin of each project individually and for multiple projects simulated together. The Project Team recommends consideration of a no growth future baseline scenario to provide additional context for evaluating the benefits of proposed projects and management actions to bring the basin into balance and meet SGMA sustainability requirements.

Subtask 9.4. Refine Costs and Description of Selected Projects and Management Actions: The Project Team will refine the costs and descriptions of the selected projects/management actions to evaluate a group of projects that are determined to be economically feasible, and compare the net effect of this group of projects on the basin relative to the sustainable yield. The GSP will include a description of each project and management action evaluated in detail, and how it will benefit the basin and contribute to sustainability. Each description will include preliminary layouts, summaries of required facilities, anticipated permitting and regulatory requirements, a schedule for design, environmental review, and construction.

Task 10 Plan Implementation

The Project Team will prepare a section for the GSP describing how the GSP will be implemented including costs, schedule, annual reporting and periodic assessment of progress towards sustainability. The GSP will include discussion of measures to be implemented to ensure sustainability, how the goal is likely to be achieved within the allowable 20-year time frame, and how the goal will be maintained.

Subtask 10.1. Estimate GSP Implementation Costs: The Project Team will sum up costs for proposed management actions, projects, monitoring, and other costs for implementation of the GSP.

Subtask 10.2. Develop GSP Implementation Schedule: The Project Team will develop a schedule for proposed management actions and projects over the 20-year implementation period.

Subtask 10.3. Develop Plan for Annual Reporting: A format for annual reports will be developed and a plan for reporting to the GSAs, local beneficial users, and DWR will be developed.

Subtask 10.4. Develop Process for Periodic Evaluations: A process for assessing the progress, and making course corrections if needed, toward sustainable yield for the basin will be developed.

Task 11 Outreach and Stakeholder Involvement

In accordance with the RFP, much of the work under this task is expected to be done by GSA partners, including meeting notifications, meeting facilitation, meeting minutes, and stakeholder participation. The Project Team will be providing technical support, meeting assistance, and incorporation this information in the GSP. Work to be conducted under this task includes outreach with interested parties and beneficial groundwater users, coordination among Basin GSAs for plan development, coordination with Monterey County GSAs and Atascadero, preparation of a communication plan and scheduling of outreach. The RFP notes that GSAs will make a determination of the level of involvement by the Project Team; therefore, our cost estimate includes base (11.1) and optional (11.2) subtasks for Project Team participation in this task.

Task 12 GSP Document Preparation

Subtask 12.1. Administrative Draft GSP: A comprehensive Administrative Draft GSP document will be prepared that incorporates all the required GSP elements. The required plan elements are detailed in Water Code 10727.2, and the GSP will include these plan elements and additional requirements where appropriate. The Administrative Draft GSP will be provided for review by the GSAs.

Subtask 12.2. Draft GSP: Administrative Draft GSP comments will be addressed and edits incorporated in a Draft GSP document. The Draft GSP will be made available for review by the GSAs, local stakeholders, and the general public. Draft comments will be compiled and organized for review by the Project Team.

Subtask 12.3. Final GSP: Draft GSP comments will be addressed and edits incorporated in a Final GSP document. The Final GSP will be submitted to the GSAs for adoption, followed by electronic submittal to DWR. This scope of work does not include responding to DWR or public comments following submittal of the adopted GSP to DWR.

Subtask 12.4. Optional: Presentation: It is anticipated that the Project Team may make a presentation at adoption hearings as part of this task.

Task 13 Project Management

This task will include the following activities: regular tracking of schedule and costs, progress updates and periodic meetings with GSAs and advisory committees, and quarterly progress reports for DWR if grant funding is obtained.

4. Schedule and Fee Proposal

Below is a preliminary timeline for tasks to prepare The GSP. This schedule provides time for GSA review of the Administrative Draft and Draft GSP documents, public comment period, public hearing, finalization, adoption by the GSA's, and submittal of the GSP prior to January 31, 2020, in accordance with SGMA requirements for critically overdrafted basins.

Project Budget and Fee Schedule

The scope of work and associated budget presented in this proposal are for the development and submittal of a compliant GSP for the Paso Robles Subbasin (located in the San Luis Obispo County portion of the Subbasin). This effort will include support in coordination efforts with Monterey County. The LSCE Project Team will work with the Paso Robles Subbasin GSA group to finalize a scope of work and budget based on Proposition 1 GSP grant funding

The total cost to conduct the tasks for developing a GSP for the Paso Robles Subbasin is estimated to be approximately $985,000 including project management. Our budget is summarized in the included Cost Summary Table, including estimated person-hours by task, along with hourly rates by labor classification.

ID	Task Number	Task Name	Start	Finish
1	**Task 1**	**Compile and Organize Data**	Mon 1/1/18	Fri 3/23/18
2	**Task 2**	**Develop Introductory Administrative Information**	Mon 1/1/18	Wed 1/31/18
3	**Task 3**	**Describe the Plan Area**	**Mon 1/1/18**	**Fri 1/31/20**
4	Subtask 3.1	Description of Plan Area	Fri 6/1/18	Mon 10/1/18
5	Subtask 3.2	Notice and Communication	Mon 1/1/18	Fri 1/31/20
6	**Task 4**	**Describe the Basin Setting**	**Mon 3/26/18**	**Fri 11/30/18**
7	Subtask 4.1	Hydrogeologic Conceptual Model	Mon 3/26/18	Fri 11/30/18
8	Subtask 4.2	Groundwater Conditions	Mon 3/26/18	Fri 11/30/18
9	Subtask 4.3	Water Budget	Mon 3/26/18	Fri 11/30/18
10	Subtask 4.4	Define Management Area (Optional)	Sat 9/1/18	Fri 11/30/18
11	**Task 5**	**Prepare Surface Water - Groundwater Flow Model**	**Mon 3/26/18**	**Tue 8/27/19**
12	Subtask 5.1	Utilize As-Is Base Model	Mon 3/26/18	Tue 8/27/19
13	Subtask 5.2	Option for Model Geographic Expansion	Mon 3/26/18	Fri 9/14/18
14	Subtask 5.3	Option for Model Base Period Update	Mon 3/26/18	Mon 12/31/18
15	Subtask 5.4	Option for Model Recharge Update	Mon 3/26/18	Sun 9/30/18
16	Subtask 5.5	Option for Subsidence Package Update	Mon 3/26/18	Sun 9/30/18
17	**Task 6**	**Identify Sustainable Management Criteria**	**Mon 12/3/18**	**Mon 7/1/19**
18	Subtask 6.1	Sustainability Goal	Mon 12/3/18	Mon 7/1/19
19	Subtask 6.2	Undesirable Results	Mon 12/3/18	Mon 7/1/19
20	Subtask 6.3	Minimum Thresholds	Mon 12/3/18	Mon 7/1/19
21	Subtask 6.4	Measureable Objectives	Mon 12/3/18	Mon 7/1/19
22	**Task 7**	**Establish Monitoring Networks and Protocol**	**Fri 6/1/18**	**Fri 8/30/19**
23	Subtask 7.1	Identify Monitoring Network Objectives	Fri 6/1/18	Fri 8/30/19
24	Subtask 7.2	Evaluate Existing Monitoring Programs	Fri 6/1/18	Mon 12/31/18
25	Subtask 7.3	Assessment of Monitoring Gaps and Description of Monitoring Network	Fri 6/1/18	Fri 8/30/19
26	Subtask 7.4	Develop Monitoring Protocols	Sat 6/1/19	Fri 8/30/19
27	**Task 8**	**Organize Data Management System**	Mon 1/1/18	Fri 1/31/20
28	**Task 9**	**Develop and Analyze Projects and Management Actions**	**Mon 4/2/18**	**Sun 9/1/19**
29	Subtask 9.1	Identification of Projects and Management Actions	Mon 4/2/18	Wed 8/1/18
30	Subtask 9.2	Develop Pre-feasibility Costs and Benefits of Projects and Management	Fri 6/1/18	Tue 1/1/19
31	Subtask 9.3	Evaluate and Select Projects and Management Actions	Wed 8/1/18	Sun 9/1/19
32	Subtask 9.4	Refine Costs and Description of Selected Projects and Management Actions	Wed 5/1/19	Sun 9/1/19
33	**Task 10**	**Plan Implementation**	**Fri 3/1/19**	**Sat 6/1/19**
34	Subtask 10.1	Estimate GSP Implementation Costs	Fri 3/1/19	Sat 6/1/19
35	Subtask 10.2	Develop GSP Implantation Schedule	Fri 3/1/19	Sat 6/1/19
36	Subtask 10.3	Develop Plan for Annual Reporting	Mon 4/1/19	Sat 6/1/19
37	Subtask 10.4	Develop Process for Periodic Evaluations	Mon 4/1/19	Sat 6/1/19
38	**Task 11**	Outreach and Stakeholder Involvement	Mon 1/1/18	Fri 1/31/20
39	Subtask 11.1	Outreach and Stakeholder Involvement	Mon 1/1/18	Fri 1/31/20
40	Subtask 11.2	Outreach and Stakeholder Involvement (Optional)	Mon 1/1/18	Fri 1/31/20
41	**Task 12**	**GSP Document Preparation**	**Mon 10/1/18**	**Tue 12/31/19**
42	Subtask 12.1	Administrative Draft GSP	Mon 10/1/18	Sat 6/1/19
43	Subtask 12.2	Draft GSP	Sat 6/1/19	Wed 9/4/19
44	Subtask 12.3	Final GSP	Thu 9/5/19	Tue 12/31/19
45	Subtask 12.4	Presentation (Optional)	Sun 12/1/19	Tue 12/31/19
46	**Task 13**	Project Management and Meetings	Mon 1/1/18	Fri 1/31/20
47	Subtask 13.1	Project Management	Mon 1/1/18	Fri 1/31/20
48	Subtask 13.2	Meetings	Mon 1/1/18	Fri 1/31/20
49	Subtask 13.3	Optional Meetings	Mon 1/1/18	Fri 1/31/20

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Cost Summary Table for Paso Robles Groundwater Basin GSP Development Services

	Luhdorff & Scalmanini, Consulting Engineers						Cleath-Harris Geologists			Geoscience Support Services				ERA Economics		Stillwater Sciences			Consensus Building Institute		Direct Costs			
Project Task/Subtask	Sr. Principal	Prin. Hydro-geologist	Sr. Hydro-geologist	Pjt. Hydro-geologist	Staff Hydrogeol-ogist/GIS	Word Processing	Prin. Hydro-geologist	Sr. Hydro-geologist	Staff Hydrogeol-ogist/GIS	Prin. Modeler	Prin. Hydro-geologist	Sr. Modeler	Sr. Hydro-geologist	Prin. Economist	Economist	S/E 18	S/E 15	S/E 12	Sr. Mediator	Associate	Mileage	Milage Cost (Rate $0.54/ mile)	**Total Cost ($)**	**Optional Task Cost ($)**
	$202	$200	$178	$140	$128	$70	$160	$150	$120	$270	$250	$223	$195	$165	$115	$238	$182	$147	$200	$95				
Task 1 - Compile and Organize Data																								
Compile and Organize Data	2	20	40	20	20			10	40		10		30										$31,534	
Task 1 Subtotals	**2**	**20**	**40**	**20**	**20**			**10**	**40**		**10**		**30**										**$31,534**	
Task 2 - Develop Introductory and Administrative Information																								
Develop Introductory and Administrative Information	2	20	40	20	20									20	20								$22,484	
Task 2 Subtotals	2	20	40	20	20									20	20								**$22,484**	
Task 3 - Describe the Plan Area																								
3.1 Description of Plan Area	2	20	20					10			10												$11,964	
3.2 Notice and Communication																			40	40			$11,800	
Task 3 Subtotals	**2**	**20**	**20**					**10**			**10**								**40**	**40**			**$23,764**	
Task 4 - Describe the Basin Setting																								
4.1 Hydrogeologic Conceptual Model	4	20	20	10	10		10	40	70							10	20	10					$34,535	
4.2 Groundwater Conditions	4	20	20	10	10		10	30	60							10	20	10					$31,835	
4.3 Water Budget	4	60	60	20	10		10	20	40	40	30	40	10										$66,138	
4.4 Define Management Areas (Optional)	4	40	40				10	10	20															$21,428
Task 4 Subtotals	**16**	**140**	**140**	**40**	**30**		**40**	**100**	**190**	**40**	**30**	**40**	**10**			**20**	**40**	**20**					**$132,508**	**$21,428**
Task 5 - Prepare Surface Water - Groundwater Flow Model																								
5.1 Utilize As-Is Base Model	2	25	15	8				16		30	20	30	8										$32,944	
5.2 Option for Model Geographic Expansion	1	25	25	8				16		30	30	30	8											$37,022
5.3 Option for Model Base Period Update	2	35	35	8				16		50	40	50	8											$53,364
5.4 Option for Model Recharge Update	2	35	25	8				16		40	30	40	8											$44,154
5.5 Option for Subsidence Package Update	1	20	20	8				16		40	30	40	8											$40,062
Task 5 Subtotals	**8**	**140**	**120**	**40**				**80**		**190**	**150**	**190**	**40**										**$32,944**	**$174,602**
Task 6 - Identify Sustainable Management Criteria																								
6.1 Sustainability Goal	4	40	20	10			10	20		10	20			10	10	10	10	10	20	20			$40,438	
6.2 Undesirable Results	8	40	40	20			10	20		20	20			10	10	10	10	10	20	20			$48,906	
6.3 Minimum Thresholds	8	80	60	20			10	30	30	30	20	20	10			10	20	10	10	10			$70,743	
6.4 Measureable Objectives	8	80	60	20			10	20	40	30	20	20	10			10	20	10	10	10			$70,443	
Task 6 Subtotals	**28**	**240**	**180**	**70**			**40**	**90**	**70**	**90**	**80**	**40**	**20**	**20**	**20**	**40**	**60**	**40**	**60**	**60**			**$230,530**	
Task 7 - Establish Monitoring Networks and Protocol																								
7.1 Identify Monitoring Network Objectives	2	20	40	10			5	30	20		10						10						$24,941	
7.2 Evaluate Existing Monitoring Programs	2	20	40	10	10		5	30	40		10						10						$28,621	
7.3 Assessment of Monitoring Gaps and Description of Monitoring Network	2	30	50	10	10		10	20	30		10						10						$30,501	
7.4 Develop Monitoring Protocols	2	20	50	10	10		5	20	40		10						10						$28,901	
Task 7 Subtotals	**8**	**90**	**180**	**40**	**30**		**25**	**100**	**130**		**40**						**40**						**$112,964**	
Task 8 - Organize Data Management System																								
Organize Data Management System	4	20	60	60	60		5	25	50														$42,118	
Task 8 Subtotals	**4**	**20**	**60**	**60**	**60**		**5**	**25**	**50**														**$42,118**	
Task 9 - Develop and Analyze Projects and Management Actions																								
9.1 Identification of Projects and Management Actions	4	60	20				5	10		10	10			10	10	5	5						$28,768	
9.2 Develop Pre-feasibility Costs and Benefits of Projects and Management	4	60	20					10	20	10	10			100	100	5	5						$55,568	
9.3 Evaluate and Select Projects and Management Actions	4	60	20				10	15		60	40	40		10	10	10	10						$62,338	
9.4 Refine Costs and Description of Selected Projects and Management Actions	4	60	20				5	10	15	10	10			100	100	5	5						$55,768	
Task 9 Subtotals	**16**	**240**	**80**				**20**	**45**	**35**	**90**	**70**	**40**		**220**	**220**	**25**	**25**						**$202,442**	
Task 10 - Plan Implementation																								
10.1 Estimate GSP Implementation Costs	2	10	10											20	20								$9,784	
10.2 Develop GSP Implementation Schedule	2	10	10																				$4,184	
10.3 Develop Plan for Annual Reporting	2	10	10																				$4,184	
10.4 Develop Process for Periodic Evaluations	2	10	10																				$4,184	
Task 10 Subtotals	**8**	**40**	**40**											**20**	**20**								**$22,336**	
Task 11 - Outreach and Stakeholder Involvement																								
11.1 Outreach and Stakeholder Involvement																			100	50			$24,750	
11.2 Outreach and Stakeholder Involvement (Optional)																			100	50				$24,750
Task 11 Subtotals																			**200**	**100**			**$24,750**	**$24,750**
Task 12 - GSP Document Preparation																								
12.1 Administrative Draft GSP	2	40	40			10	8			4	4			8		4							$21,857	
12.2 Draft GSP	2	30	30			8	6			2	4			6		2							$16,271	
12.3 Final GSP	2	20	20			4	4			2	2			4		2							$11,061	
12.4 Presentation (optional)	2	24	4				10			10											1,000	$535		$10,751
Task 12 Subtotals	**8**	**114**	**94**			**22**	**28**			**18**	**10**			**18**		**8**						**$535**	**$49,189**	**$10,751**
Task 13 - Project Management and Meetings																								
13.1 Project Management		50					10				10			5		5			5				$17,117	
13.2 Meetings (assumes: 5 meetings for LSCE; 3 meetings for both CHG and GS; 2 meetings for both ERA and Stillwater)		50	50				18			10	20			20		20					5,000	$2,675	$40,222	
13.3 Optional Meetings (assumes: 5 meetings for LSCE; 2 meetings for GS; 1 meeting for ERA)		50	50				12			10	10			10							2,000	$1,070		$28,740
Task 13 Subtotals		**150**	**100**				**40**			**20**	**40**			**35**		**25**			**5**			**$3,745**	**$57,339**	**$28,740**
Totals	**102**	**1,234**	**1,094**	**290**	**160**	**22**	**198**	**460**	**515**	**448**	**440**	**310**	**100**	**333**	**280**	**118**	**165**	**60**	**305**	**200**		**$4,280**	**$984,898**	

5. Contract Terms & Exceptions

The LSCE Project Team does not take exception to any of the terms of the Professional Services Agreement.

6. Local Agency References

Client: Farmers Water District

Project: GSA Formation, GSP Development and Related Services, Delta-Mendota Subbasin

Service Dates: 2015 to Present

Contact: Jim Stilwell, President; 559-674-8897; jds@logoluso.com

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Client: Madera County

Project: GSP Technical Support Services for Chowchilla and Madera Subbasins

Service Dates: 2016 to Present

Contact: Julia Berry; 559-675-7821 ext. 3451; Julia.Berry@co.madera.ca.gov

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Client: Westlands Water District

Project: Groundwater Studies for Irrigated Lands Regulatory Program; Groundwater Flow and Transport Model; GSP Technical Support Services for Westside Subbasin

Service Dates: 2014 to Present

Client: Jose Gutierrez; 559-224-1523; jgutierrez@westlandswater.org

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Client: Napa County Division of Water Resources

Project: Comprehensive Groundwater Resources Program, Numerous Studies, Preparation of report "Napa Valley Groundwater Sustainability: A Basin Analysis Report for the Napa Valley Subbasin" (an Alternative to a GSP)

Service Dates: 2009 to Present

Contact: R. Patrick Lowe; 707-259-5937; patrick.lowe@countyofnapa.org

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Client: Solano County Water Agency

Project: Comprehensive Groundwater Resources Program; Numerous Studies on Groundwater Conditions/Hydrogeologic Conceptualization; Data Management System; CASGEM Monitoring Workplan; GSP Technical Support Services for DWR Prop 1 Grant Application

Service Dates: 2006 to Present

Client: Chris Lee; 707-455-1105; clee@scwa2.com

7. Disclosures

Over the past five years, the LSCE Project Team has not had any litigation, arbitration or claims proceedings which involve any of the consultants identified in this proposal.